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**Draft**

# Addendum to the Comprehensive Characterization of the Lower Grasse River

## Volume II – Appendices

**April 2009**

**Grasse River Study Area**

**Massena, New York**

ALCOA

**VOLUME II – APPENDICES**

**CONTENTS**

## Summary of Pre-Phase I Monitoring Activities

In accordance with the Capping Pilot Study 2003 Monitoring Program (Alcoa, April 2003), cap elevation measurements were collected in the Capping Pilot Study area between May 5 and 6, 2003. Measurements were collected in Pilot Cells #2 through #4 on the 25-foot by 25-foot grid nodes used in the 2001 and 2002 monitoring programs (Alcoa, April 2002; Alcoa, February 2003). Each grid node was located using differential global positioning system (DGPS) surveying techniques. At each location, the water surface elevation was recorded and the total depth of the water to the top of the cap was measured and recorded. The water surface elevation and the total water depth were then used to determine the elevation of the cap material/water interface at each grid node. Cap thickness was then determined by comparing the elevation of the cap material/water interface at each grid location in 2003 to that obtained during the pre-capping event in 2001. Two sets of measurements were obtained in each pilot cell in an effort to assess measurement uncertainty.

The cap thickness measurements from the initial May 5 to 6, 2003 survey indicated that cap thickness had changed at many grid node locations when compared to measurements collected in October 2001 and April 2002. As a result, additional investigation activities were performed to verify the initial cap thickness measurements. These activities included: collection of additional cap thickness measurements; sediment core collection; underwater video observation; and sediment probing. These activities are described below.

The initial 2003 cap thicknesses from the two sets of measurements in the pilot cells are provided on Figure 1. For comparison, the April 2002 cap thickness can be found on figures provided in the *2002 Capping Pilot Study Monitoring Program Summary Report* (Alcoa, February 2003).

**Additional Cap Thickness Measurement Rounds**

To confirm the initial 2003 measurements, a third round of cap elevation information was collected in Pilot Cell #2 on May 19, 2003. This third measurement effort was performed at grid nodes at least 25 feet from the boundary of the cell (i.e., second row of grid nodes), thereby avoiding nodes closest to the cell edges and side slopes where cap thickness variability is more likely. Specifically, measurements were collected in a rectangular area bounded by grid nodes PC2-08, PC2-11, PC2-50, and PC2-53 (see Figure 1). This third set of measurements were similar to the initial two measurement rounds in Pilot Cell #2, indicating that a change in cap thickness had indeed occurred in areas of this cell since April 2002. The results from this third measurement round are provided on Figure 1.

To further characterize the extent of the observed changes in cap thickness, additional cap elevation measurements were obtained from the entire Test Cell, an additional area extending approximately 95 feet upstream of Test Cell Subcell #1D, and Pilot Cells #3 and #4. These activities were performed between May 29 and 30, 2003. For the Test Cell and immediately upstream, measurements were collected from the same grid nodes used during the 2001 and 2002 monitoring programs. In Pilot Cells #3 and #4, measurements were collected in a manner similar to that used in Pilot Cell #2 (i.e., second row of grid nodes avoiding edge and side slope areas) in rectangular areas bounded by PC3-02, PC3-05, PC3-50, and PC3-53, and PC4-02, PC4-05, PC4-44, and PC4-47, respectively. Figure 1 provides the 2003 calculated cap thickness measurements in the Test Cell and upstream area and the sub-area of Pilot Cells #3 and #4. These measurements also indicated that a change in cap thickness occurred in these portions of the Capping Pilot Study area.

**Sediment Core Collection**

Sediment cores were collected in Pilot Cell #2 concurrent with the third round of cap elevation measurements on May 19, 2003. These sediment cores were collected for visual observation of the cap material/native sediment interface and depth of sediment recovered. A total of five cores were collected at the following grid nodes: PC2-20, PC2-21, PC2-27, PC2-46, and PC2-50.

Additional sediment cores were collected at select locations in Pilot Cells #3 and #4 in areas that were observed to have changes in cap thickness to allow for visual observation of the cap material/native sediment interface at those locations. A total of 16 sediment cores were obtained between May 30 and June 3, 2003. Specifically, cores were collected at the following grid nodes (see Figure 1 for grid node location): PC3-06; PC3-10; PC3-15; PC3-27; PC3-32; PC3-38; PC3-44; PC4-02; PC4-14; PC4-27; PC4-26; PC4-15; PC4-4; PC4-38; and PC4-35. Collection was also attempted at PC3-20, but a core could not be obtained due to lack of recoverable sediment. It should be noted that no attempt was made to move off the grid location in an attempt to collect a core.

All sediment cores were obtained via manual collection techniques using Lexan® tubing with a check valve push core apparatus in accordance with the collection protocol described in the 2003 Monitoring Work Plan (Alcoa, April 2003). The location of sediment core was determined and recorded using DGPS surveying techniques. All recovered sediment cores were visually observed and photographed intact through the Lexan® tubing and the physical characteristics of each stratigraphic layer recorded. These characteristics included general soil type (sand, silt, clay and organic matter/other matter), as determined using the Unified Soil Classification System (USCS) and approximate grain size (fine, medium, and coarse). Photographic logs for these samples are provided in Appendix L.

Eight representative sediment cores were selected for grain size analysis including cores from grid nodes PC3-06, PC3-15, PC3-32, PC3-44, PC4-02, PC4-27, PC4-4, and

PC4-38. These cores were segmented according to the stratigraphic layers observed in the core, with one sample per stratigraphic layer submitted to the Camp Dresser & McKee (CDM) Soils Laboratory in Cambridge, Massachusetts for grain size analysis.

At each core collection location, measurements of total water depth, total sediment depth probed, and total sediment recovered were obtained and recorded in the field log book. All samples were handled, packaged and shipped according to the protocol described in the 2003 Monitoring Work Plan (Alcoa, April 2003). Quality Assurance/Quality Control (QA/QC) samples included one blind duplicate sample, also analyzed for grain size, per 20 samples collected.

**Underwater Video Observation**

On June 2 and 3, 2003, an underwater video camera was used to provide underwater visual documentation of the physical condition of the Capping Pilot Study area. A total of eight locations were selected throughout the study area specifically targeting areas that, based on the cap thickness measurements, had changed. These locations are shown on Figure 2. At each location, a concrete block was lowered to the river bottom and the boat tethered to the block. Underwater video coverage was obtained by lowering the video camera from the boat into the water column and videotaping a circular area (with an approximate radius of 15 feet) around the location. Videotaping was performed continuously for approximately 10 minutes at each location.

In summary, the results of the underwater video coverage showed that areas of boulders/cobbles/hard bottom were visible in upstream areas of the pilot study. As the video coverage progressed downstream the river bottom transitioned to a fairly smooth "granular" surface. An abridged version of the underwater video is provided in Appendix M.

**Sediment Probing Transects**

As part of the additional field investigation activities, data from four probing transects were collected immediately adjacent to the pilot study area on June 3, 2003. These included one upstream of the CPS area [sediment probing transect T14] and three downstream of the CPS area (T-17, T-17-A200, T-17-A400). These transects were selected since they had been probed during previous field efforts conducted in 2001 (with the exception of T14 where previous field efforts were performed in 1992; sediment depth readings collected during this effort were rounded to the nearest half foot).

The results of this work are shown on Figure 3. This figure illustrates the location of each transect in relation to the CPS area, as well as indicates specific locations where probing was performed in 2003 and 2001 (1992 for T14). Additionally, for each of the 4 transects, a cross section is provided on Figure 4 that shows 2003 conditions in comparison to previous conditions. It should be noted that the bottom of sediment profile for data at each transect collected in subsequent years is expected to vary to some extent due to positioning differences at each grid node location across surveys and in accuracies associated with depth readings, which are estimated to be on the order of tenths of a foot. In addition, variability is introduced by the fact that water surface elevation varies between surveys. The top of sediment as shown on Figure 4 is estimated through measurement of water depths assuming a common water surface elevation; however water depths can fluctuate by as much as one foot throughout the day. This variability is not accounted for in comparisons shown on Figure 4.

In general, in 2003, T14 (located upstream of the CPS area) exhibited very little soft sediment (maximum of 0.6 feet) and in most cases the presence of impenetrable rock at the sediment surface. The presence of this impenetrable rock may make it appear that the "bottom of sediment" depth at this transect is different from 1992; other reasons for this variability are discussed above. T-17, T-17-A200 (collected about 200 feet downstream of T17), and T-17-A400 (collected about 400 feet downstream of T17) exhibited the presence of several feet of soft sediment in the channel (as illustrated on

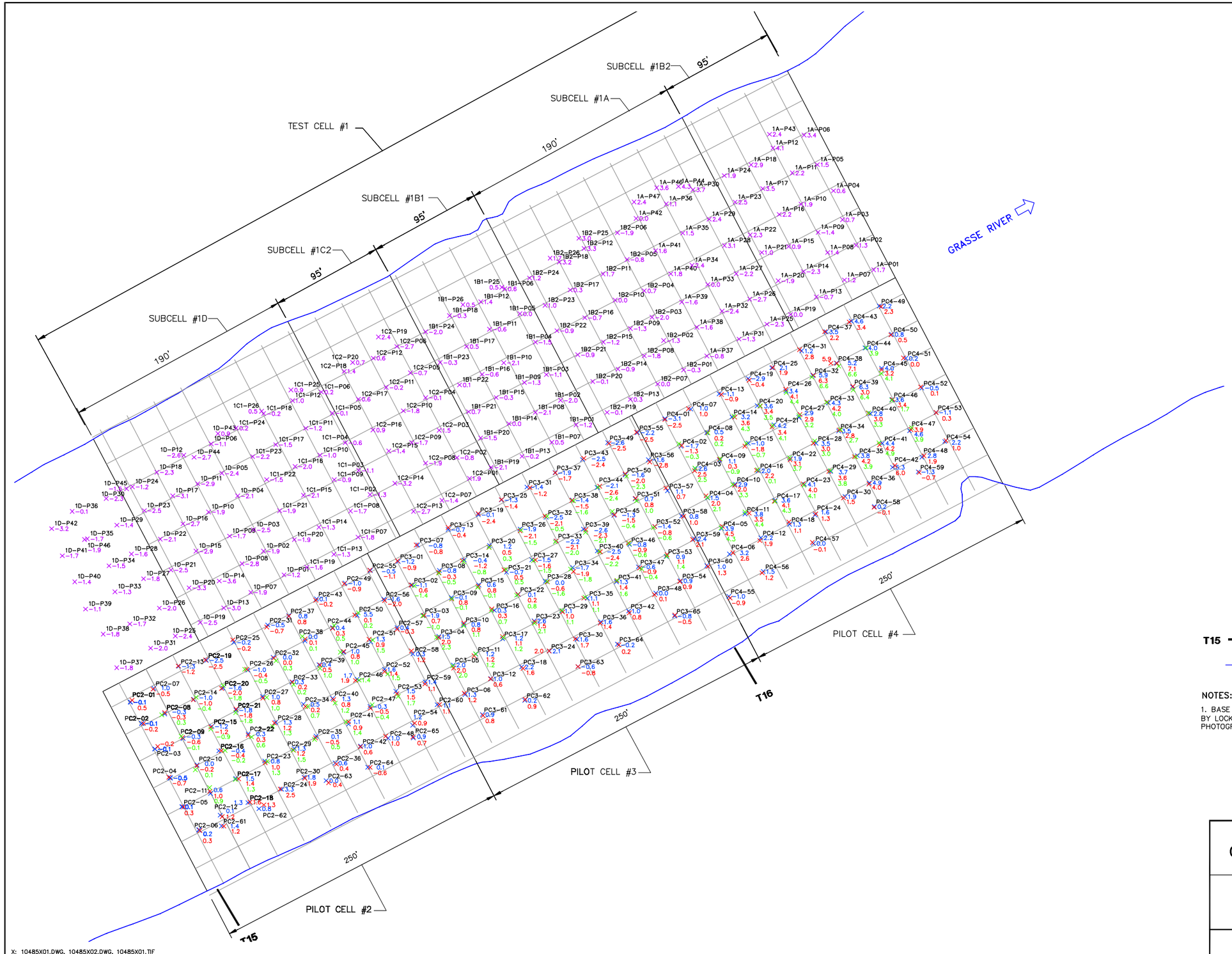
Figure 4). The majority of material in the channel bottom at these transects was described as silt or sand overlying a stiff clay or rock.

**References**

Alcoa Inc. (Alcoa). *2003 Monitoring Work Plan*. April 2003.

Alcoa. *2002 Capping Pilot Study Monitoring Program Summary Report.* February 2003.

Alcoa. *Documentation Report – Grasse River Capping Pilot Study.* April 2002.




**LEGEND:**

| | |
|---|---|
| ×1.1 | MAY 2003 ROUND 1 PILOT CELL CAP THICKNESS |
| ×0.9 | MAY 2003 ROUND 2 PILOT CELL CAP THICKNESS |
| ×1.4 | MAY 2003 ROUND 3 PILOT CELL CAP THICKNESS |
| ×1.4 | MAY 2003 TEST CELL CAP THICKNESS |
| PC4–58 | POINT ID |
| T15 | 1992 SEDIMENT PROBING TRANSECT LOCATION |
| | RIVER BOUNDARY |

**NOTES:**

1. BASE MAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY.

0 40' 80'
GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

# COMPREHENSIVE CHARACTERIZATION OF THE LOWER GRASSE RIVER ADDENDUM

## 2003 CAP THICKNESS MEASUREMENT RESULTS

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FIGURE 1

X: 10485X01.DWG, 10485X02.DWG, 10485X01.TIF
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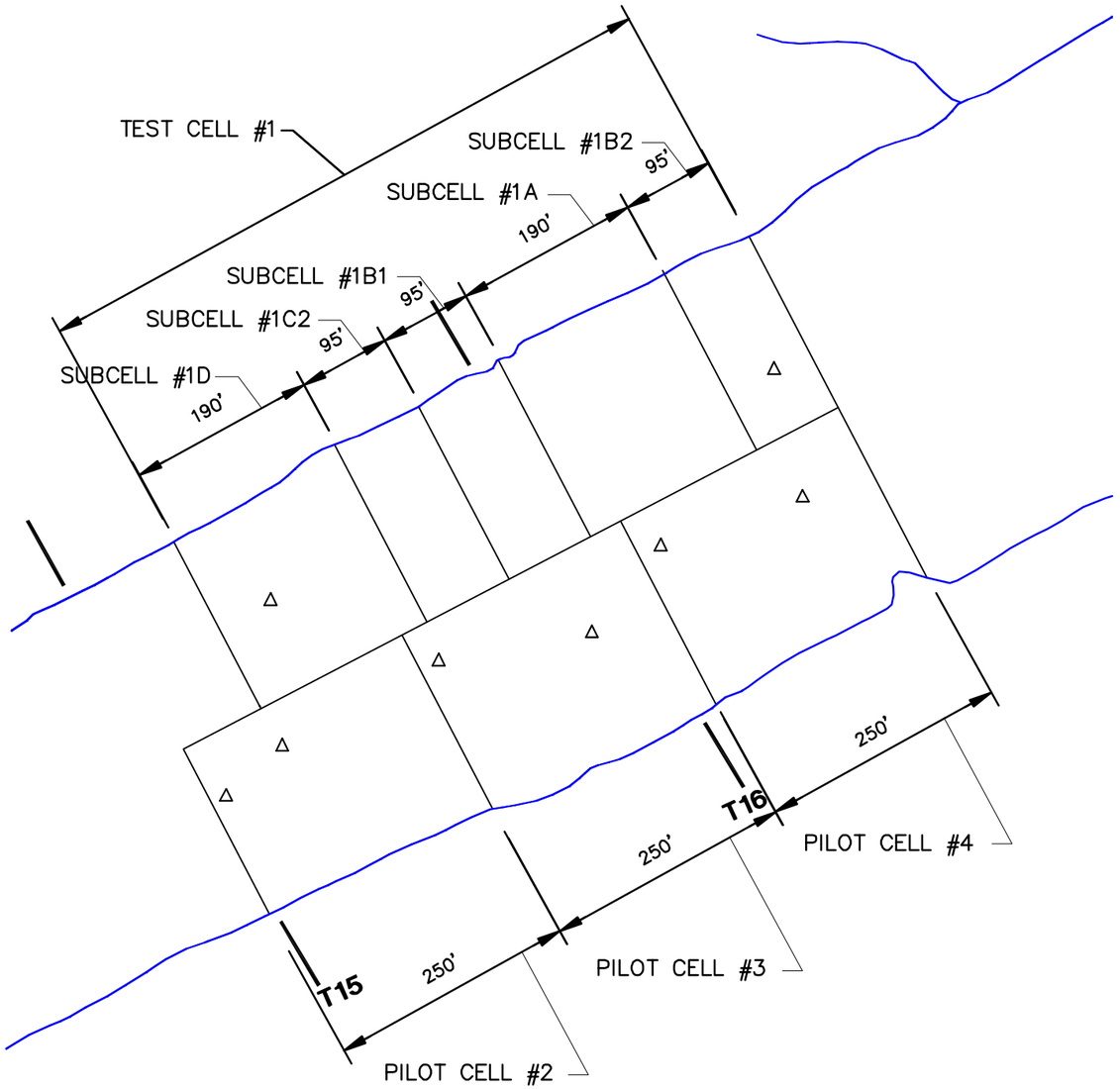


LEGEND:

T14 — 1992 SEDIMENT PROBING TRANSECT LOCATION

RIVER BOUNDARY

△ JUNE 2003 UNDERWATER CAP OBSERVATION CENTER POINT (SEE NOTE 2)

NOTES:

1. BASE MAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY.

2. UNDERWATER CAMERA VIDEO COVERAGE WAS OBTAINED AT LOCAL POINTS BY LOWERING A CONCRETE BLOCK AT EACH CAP OBSERVATION CENTER POINT AND VIDEOTAPING AN AREA WITH AN APPROXIMATE RADIUS OF 15 FEET AROUND THE CENTER POINT.

0 150' 300'

GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

**COMPREHENSIVE CHARACTERIZATION OF THE LOWER GRASSE RIVER ADDENDUM**

# JUNE 2003 UNDERWATER CAP OBSERVATION LOCATIONS

ALCOA

FIGURE 2

X: 10485X00.DWG, X02.DWG, 10485X01.TIF
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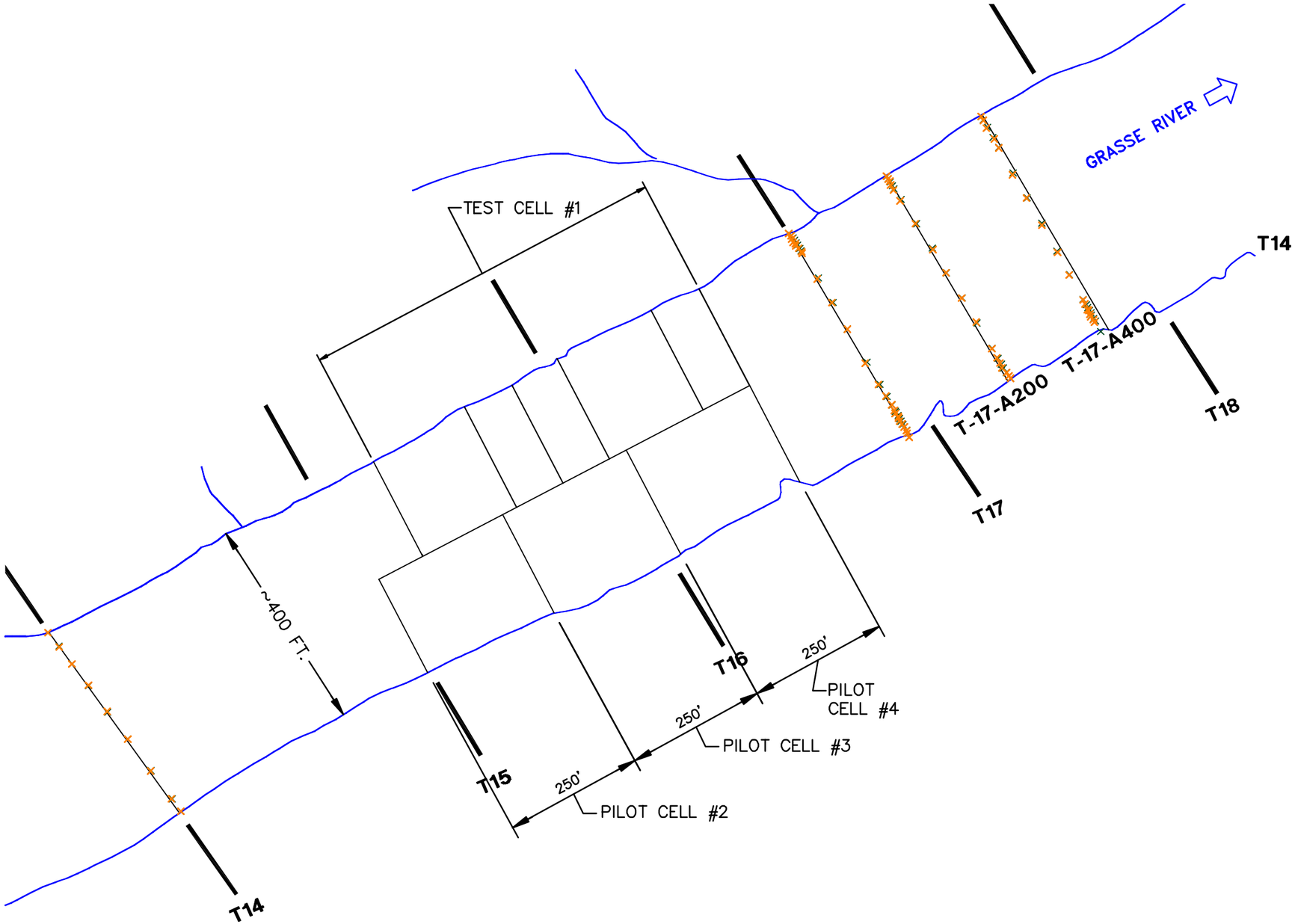


**LEGEND:**

- 1992 SEDIMENT PROBING TRANSECT LOCATION
- RIVER BOUNDARY
- × PRE–CAPPING PILOT STUDY SEDIMENT PROBING LOCATIONS (1992 OR 2001)
- × POST–CAPPING PILOT STUDY SEDIMENT PROBING LOCATIONS (2003)

**NOTES:**

1. BASE MAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY.

2. ALL SEDIMENT PROBING LOCATIONS ARE APPROXIMATE.

3. THE PRE–CAPPING PILOT STUDY SEDIMENT PROBING LOCATIONS ALONG T14 WERE COLLECTED IN 1992, AND THE PRE–CAPPING PILOT STUDY SEDIMENT PROBING LOCATIONS ALONG THE TRANSECTS ADJACENT TO T17 WERE COLLECTED IN 2001.

0 200' 400'

GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

**COMPREHENSIVE CHARACTERIZATION OF THE LOWER GRASSE RIVER ADDENDUM**

**SEDIMENT PROBING TRANSECT LOCATIONS ADJACENT TO THE CAPPING PILOT STUDY AREA**

ALCOA

FIGURE **3**

X: 10485X00.DWG, X02.DWG, 10485X01.TIF
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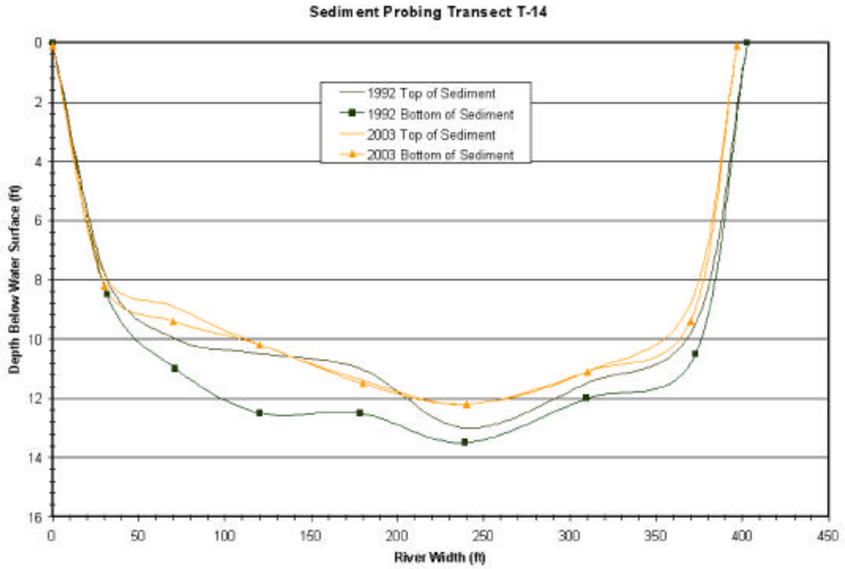


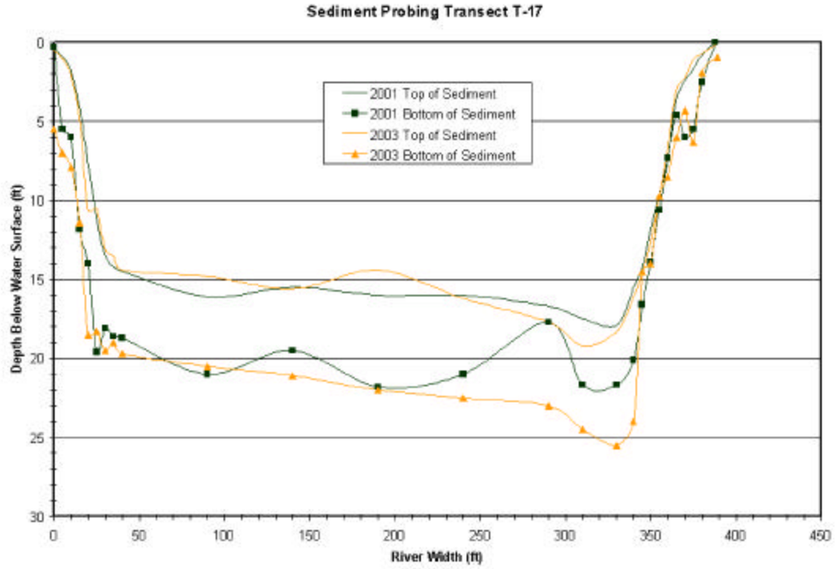


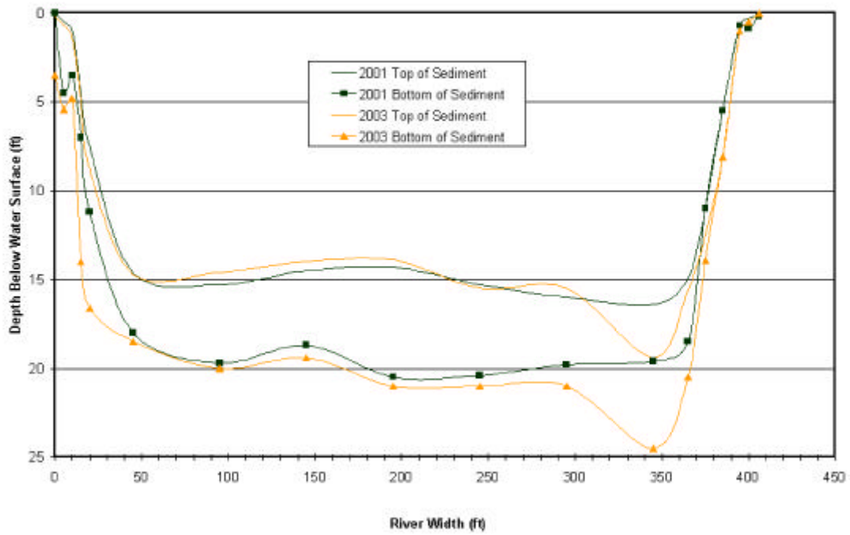


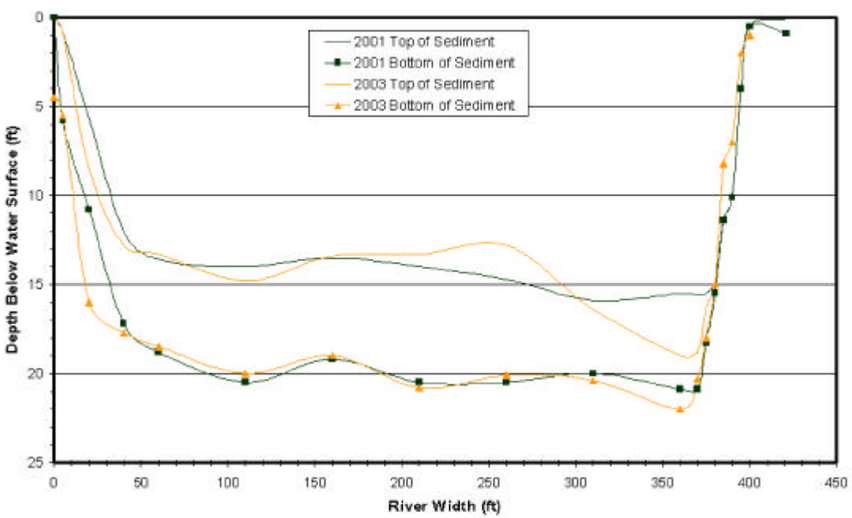


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P: PAGESET/SYR-BL
3/12/04 SYR-85-GMS GMS LJP
10485001/10485G33.DWG

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
COMPREHENSIVE CHARACTERIZATION OF THE LOWER GRASSE RIVER ADDENDUM

**SEDIMENT PROBING TRANSECT LOCATIONS ADJACENT TO THE CAPPING PILOT STUDY AREA - CROSS SECTIONS**

ALCOA

FIGURE
**4**

**Grasse River Ice Evaluation Work Plan**
**Grasse River, Massena, NY**

## 1.0 Introduction

This plan outlines the components of the river ice evaluation for the Grasse River located in Massena, New York. The work is being conducted in response to observations conducted in the Grasse River capping pilot study (CPS) area in spring 2003, which indicated that disturbance of the cap and underlying sediments occurred in some areas of the CPS between the summer of 2002 and the spring of 2003. These results were not expected in view of the significant body of information that had been collected regarding the stability of both cap material and the native sediments under a variety of flow conditions in the lower river, including low-frequency, high flow events. Based on observations conducted during the spring 2003 ice breakup on the river, coupled with a review by experts in river ice processes, available information supports that the observed changes to the CSP area were a result of the formation of an ice jam in the river in the area of the CPS.

The primary objective of the river ice evaluation program is to answer a number of fundamental questions which are important to both understand the mechanism(s) responsible for the observed changes in the CPS area in 2003, and to understand the significance of these types of events with respect to the formulation of remedial alternatives for the river. This list of questions is provided in Table 1.

The general approach for the program includes the following elements:

- Identification of additional resources with expertise in the area of river ice processes.
- Review of available information and identification of data gaps by these resources.
- Development of a site-specific river ice model to support identification of the operative mechanisms during the spring 2003 ice jam event and support projections related to the location and frequency of future events.
- Collection of field data, which will be integrated with the modeling analysis, to conduct an assessment of the location and frequency of historical ice jam events (hindcasting analysis) in the lower Grasse River, including the 2003 ice jam.
- Utilization of both field data and ice jam modeling results to support projections regarding the location, magnitude, and frequency of future ice jams events.
- Evaluation of river ice mitigation techniques and their potential to manage the ice breakup conditions in the Grasse River CPS area.
- Integration of the Grasse River ice evaluation findings into the evaluation of remedial options for the lower Grasse River.

Details regarding the specific activities to be conducted in support of this approach are provided below.

## 2.0 River Ice Evaluation Tasks

### 2.1 Selection of River Ice Experts

Alcoa conducted research to identify and locate nationally recognized experts in the field of river ice engineering. The research included a review of universities, governmental agencies, and consultants in both the United States and Canada.

Specialists in river ice engineering were contacted and discussions held to assess the applicability of their river ice expertise to the Grasse River conditions. Site visits were held with selected river ice experts.

The following experts have been retained by Alcoa for the Grasse River ice evaluation:

| Name | Organization | Role |
|---|---|---|
| Dr. Hung Tao Shen | Clarkson University, Department of Civil and Environmental Engineering | Numerical modeling of ice breakup |
| Dr. George Ashton | Consultant. Retired US Army Engineer Research and Development Center, Cold Region Research and Engineering Laboratory (CRREL) | Overall technical evaluation of river ice processes |
| Dr. Guenther Frankenstein | Consultant. Retired CRREL | River ice engineering |
| Andrew M. Tuthill | CRREL | Ice mitigation evaluation |
| Dr. Rudy Slingerland | Penn State University Department of Geosciences | Sediment chronology and bed scour |

### 2.2 2003 Ice Breakup Mechanisms

Alcoa collected photographic documentation of the spring 2002 and spring 2003 ice breakup along the lower Grasse River. Meteorological data for these periods will be compiled. Utilizing this information and other available site data, an understanding of the probable mechanisms for the spring 2003 ice breakup along the lower Grasse River will be developed.

### 2.3 Coordination of River Ice Evaluation with 2003 Phased Sampling Activities

Concurrent with this river ice evaluation, Alcoa will be conducting a phased sampling approach within and immediately adjacent to the CPS area. This phased approach will be coordinated with the river ice evaluations. Data from these two concurrent activities will be continuously shared to enhance the quality of both programs and provide for a better understanding of the changes to the river bottom that occurred in the spring of 2003.

### 2.4 Field Investigations

The CPS area will be inspected in detail for tree scars and other signs of past ice runs and ice jams. Collected data will be catalogued and mapped. Information developed from this effort will support an understanding of which reaches of the river have been affected by ice jam formation in the past.

Ice source reaches above Massena will be inspected to identify potential low velocity (sheet ice) and high velocity (frazil producing) reaches and also likely ice jamming sites that might limit the breakup ice volume reaching the CPS area. Potential ice retention sites in Massena and upstream of the settled area also will be examined. Cross sections needed to evaluate mitigation alternatives will be collected.

Stratigraphic analysis of the river bottom will be performed to develop a causal chronology of sediment erosion, transport and deposition during the spring 2003 event and determine the number, location and magnitude of similar bed events that may have occurred historically. Sub-bottom profiling and analysis of existing and newly-collected sediment cores will be performed to identify these bed scour/fill events.

### 2.5 Historic Record of Ice Breakup

The historic records for the Massena area will be further researched for information on ice jams. The historical records review will include research of the local Massena newspaper archives, local Massena Museum records, discussions with the Massena Historian, contacting local residents with properties along the lower Grasse River and a review of national ice jam databases.

The information on historical ice breakup conditions in the Grasse River will be compiled and summarized in a technical memorandum.

### 2.6 Hindcasting Grasse River Ice Breakup

A river ice breakup hindcasting assessment will be conducted using the historic meteorological data, estimated spring Grasse River hydrographs, and estimates of ice thickness (Shen and Yapa, 1984). The available local period of weather records for Massena is from 1948 to present. Other sources of historic weather information will be evaluated to develop a comprehensive understanding of the range of winter/spring weather conditions. The hindcasting evaluation for the lower Grasse River will concentrate on the post-1958 conditions when discharges from the Power Canal ceased.

The results of the ice breakup hindcasting will be presented in a technical memorandum.

### 2.7 Numerical Ice Breakup Modeling

A dynamic river ice model will be developed to assess ice breakup conditions in the lower Grasse River. The ice model will simulate the complex relationships between the hydraulic, meteorological, thermal and ice cover stability variables. The ice model will be used to better understand the ice breakup process and the reaches of the lower Grasse River that could be potentially impacted by ice breakup/ice jams. The ice model also will be used to evaluate ice mitigation alternatives and their effectiveness in controlling the potential impacts associated with the ice breakup process.

Based on a review of the literature and discussion with the ice experts listed above, as well as other experts familiar with river ice engineering, the Clarkson University DynaRICE[1,2,3] model was selected to perform the river ice numerical modeling. The model domain will extend from the Main Street Bridge in Massena to the St. Lawrence River. This domain will be extended several miles upstream of the Route 37 Bridge for purposes of evaluating ice mitigation alternatives. The bathymetry data for the lower Grasse River will be the same data that is currently used in the hydrodynamic model developed for the site.

The ice model will be calibrated utilizing the spring 2003 photographic data, runoff hydrograph and meteorological conditions. Sensitivity analyses will be performed on model input parameters. The ice model will provide an assessment of the potential ice jam conditions in the Grasse River CPS area, estimates of the resulting backwater flooding conditions and estimates of flow conditions under the toe of the ice jam for the Spring 2003 ice breakup conditions.

### 2.8 Scenario Analysis

Utilizing the ice model developed from the above task, a range of meteorological conditions will be simulated to better understand the likelihood of potential ice breakup conditions in the lower Grasse River. The results of the hindcasting evaluation will identify those years and meteorological conditions with a potential to cause ice jams. The ice model will be used to simulate the ranges of ice breakup conditions that could potentially occur in the lower Grasse River, including the stretches of rivers which may be impacted by ice jams and their associated river conditions. The results of this work will be compared with the results of the sediment

stratigraphy analysis and the tree scar survey to provide an assessment of the consistency of the model with historical ice jam events.

A technical report documenting the ice modeling study will be prepared.

### 2.9 River Ice Jam Mitigation

An evaluation of activities that can be taken to reduce, prevent or remove ice jams (ice jam mitigation) will be performed. This will include an evaluation of both structural and non-structural ice jam mitigation techniques. The potential impacts of the ice jam mitigation alternatives will be simulated using the ice model.

A technical report documenting the evaluation and preliminary recommendations or ice mitigation alternatives will be prepared.

### 2.10 Evaluation of Related Issues

In conjunction with the above activities, the river ice expert group will be asked to provide technical comments on the questions presented in Table 1 related to, 1) the impact of river ice processes on near shore areas in the lower river, and 2) the potential for sediment bed scour associated with ice related processes to deposit sediments in bank areas above the normal water line of the river.

### 2.11 Integration of Ice Evaluation with Remedial Alternatives

The results of the river ice evaluation will be integrated into the evaluation of remedial alternatives for the Grasse River.

## References


1. Shen, H.T. and Liu, L. 2003. "Shokotsu River Ice Jam Formation," *Cold Regions Science and Tech.*, 37(1), 35-49.
2. Shen, H.T., Su, J., and Liu, L. 2000. "SPH Simulation of River Ice Dynamics," *Journal of Computational Physics*, 165(2), 752-770.
3. Shen, H.T., and Lu, S. 1996. "Dynamics of River Ice Jam Release,: *Proceedings, 8th International Conference on Cold Regions Engineering*, ASCE, Fairbanks, AK, 594-605.
4. Shen, H.T., and Yapa, P.D. 1983. Simulation of the St. Lawrence River ice cover thickness and breakup. Report No. 83-1, *Department of Civil and Environment Engineering*, Clarkson College, Potsdam, NY, p. 57.
5. Shen, H.T., and Yapa, P.D. 1984. "A unified degree-day method for river ice cover thickness simulation," *Department of Civil and Environment Engineering*, Clarkson College, Potsdam, NY.
6. Federal Emergency Management Agency, May 1980. Flood Insurance Study, *Village of Massena, New York, Community Number 360705*.

**Table 1 – Key Questions Related to River Ice Processes in the Lower Grasse River**

Mechanism

1. What was the mechanism(s) that caused the 2003 ice jam in the lower Grasse River?

2. What are the most likely scour mechanisms that occurred in the CPS area in 2003 (hydraulic, ice grounding, other?, combination?)?

Impact

3. What portion of the lower Grasse River could be impacted by sediment scour associated with ice jams? What is the level of certainty associated with this analysis?

Predictability/Future Events

4. What are the best tools available to predict the frequency and severity of occurrence of ice jams in the lower Grasse River? What is the level of certainty associated with these tools?

5. Have these events occurred in the past? What frequency of occurrence did the 2003 event represent?

Mitigation/Remedy

6. What mitigation measures are available to control the river ice to prevent ice related impacts to the sediments in the lower Grasse River? What is the reliability and cost of the available mitigative measures?

Related Issues

7. What are the projected impacts of ice-related processes in the lower Grasse River on sediments in the shallow water areas (less than 5 feet deep)?

8. What is the potential for ice jam-related sediment resuspension to deposit PCB impacted sediments on the river banks (above normal water line) during breakup?

**Phase I Sediment Sampling Plan for the Capping Pilot Study Area and Immediate Vicinity**
**June 2003 Additional Investigation**
**Grasse River, Massena, NY**

## 1.0 Introduction

This plan provides the components of the first phase of the sediment sampling program to be conducted within and adjacent to the Capping Pilot Study (CPS) area in June 2003. Specifically included in this outline are the sampling locations, protocol, analyses, and quality assurance/quality control (QA/QC) measures associated with each component. Note that a second phase will be outlined during and/or after completion of Phase I field activities, and will incorporate the results of this first phase of sediment sampling and the bathymetric surveys being performed in the river.

The major components of the June 2003 Sampling Plan include:

- Sediment PCB analyses in the CPS area within the channel and side slope areas;
- Sediment PCB analyses within the channel area located immediately downstream of the CPS area (i.e., between sediment probing Transects T17 and T21); and
- Sediment PCB analyses in near shore areas (i.e., areas with water depths less than 5 feet) between sediment probing Transects T16 and T21.

## 2.0 PCB Sampling Plan Major Components

### 2.1 CPS Area

Within the CPS area, a total of 12 cores and 32 surficial (i.e., 0 to 3 inches) grab samples will be collected either along the river bottom or side slopes. Figure 1 provides the approximate location of all samples to be collected within the CPS area (with the exception of near shore samples which are provided on Figure 2). The following provides details regarding collection of these samples.

Core Collection

- Collect 6 cores within the channel with 2 cores each in areas of cap material loss, native sediment scour, and accretion (see Figure 1 – locations determined considering results of May 2003 cap thickness measurements).
- Collect 3 cores spaced equally along the northern and southern side slope areas (i.e., total of 6 cores – see Figure 1).
- Each core will be segmented 0 – 1 centimeters (cm), 1 cm – 3 inches, 3 – 6 inches, 6 – 12 inches, 12 – 18 inches, 18 – 24 inches, and every foot thereafter.
  - Segmentation below the 3-inch depth may be altered to conform with stratigraphic boundaries if such boundaries are visible.
- All samples will be submitted for PCB (congener), TOC, bulk density, moisture content, and grain size analyses.
  - If insufficient volume is available (especially considering the 0 – 1 cm segment), grain size analysis will be not be conducted.
- All cores will be photographed and the physical characteristics of each segment will be recorded. These characteristics will include general soil type (sand, silt, clay and organic matter/other matter, as determined using the Unified Soil Classification System (USCS) and approximate grain size (fine, medium, coarse).

Surface Samples

- Collect 32 surficial grab samples (i.e., 0 to 3 inches) within the channel throughout the CPS area (see Figure 1).

- All samples will be submitted for PCB (congener), TOC, bulk density, moisture content, and grain size analyses.
- The physical characteristics of each sample will be recorded. These characteristics will include general soil type (sand, silt, clay and organic matter/other matter, as determined using the USCS and approximate grain size (fine, medium, coarse).

**2.2 Transects T17 to T21**

Sampling between sediment probing Transects T17 and T21 will provide information for the area immediately downstream of the CPS area. A total of 15 cores and 17 surficial grab samples will be collected along the channel. Figure 2 provides the approximate location of all samples to be collected within this area (along with all near shore sampling presented in Section 2.3). The following provides details regarding collection of these samples.

Core Collection

- Collect 15 cores within the channel (2 cores each along sediment probing Transects T17, T18, T19, T20 and T21 - see Figure 2) within this area. 5 cores will be subjected to geochronological analyses only, 5 cores will be subjected to geochronological and PCB analyses (with a subset for lead-210), and the remaining 5 cores will be analyzed for grain size only. Additional details follow.

  - 5 PCB cores will be segmented into 1-cm sections. The top 8 cm (0 – 1 cm, 1 – 2 cm, … 7 – 8 cm) and every fifth interval thereafter starting with the 9 – 10 cm section (i.e., 9 – 10 cm, 14 - 15 cm, etc.) will be submitted for analyses. These cores will be collected from locations T17N-03, T17M-03, T18M-03, T19M-03, and T20M-03 (unless field observations indicate substitution of a core from another collection location would be appropriate) - see Figure 2.
    - Samples will be submitted for PCB (congener), TOC, bulk density, and moisture content analyses.
      - Lead-210 analysis will be performed on 3 of the cores (T17M-03, T-18M-03, and T19M-03 – see Figure 2).

  - 5 geochronology cores will be segmented into 1-cm sections. The top 5 cm (0 – 1 cm, 1 – 2 cm, …4 – 5 cm) and every fifth interval thereafter (9 – 10 cm, 14 - 15 cm, etc.) will be submitted for analyses. These cores will be collected from T18N-03, T19N-03, and T20N-03, T21N-03, and T21M-03 (unless altered in field) - see Figure 2.
    - Samples will be submitted for TOC, bulk density, and moisture content analyses.

  - 5 cores (co-located with the PCB cores) will be segmented 0 –3 inches, 3 – 12 inches, and every foot thereafter. These cores will be collected from T17NA-03, T17MA-03, T18MA-03, T19MA-03, and T20MA-03 (unless field observations indicate substitution of a core from another collection location would be appropriate) - see Figure 2.
    - Segmentation below the 3-inch depth may be altered to conform with stratigraphic boundaries if such boundaries are visible.
    - Samples will be submitted for grain size analysis.

  - All cores will be photographed and the physical characteristics of each segment will be recorded. These characteristics will include general soil type (sand, silt,

clay and organic matter/other matter, as determined using the USCS and approximate grain size (fine, medium, coarse).
- Core segments not submitted for laboratory analysis will be archived at the laboratory.

Surface Samples
- Collect 17 surficial grab (i.e., 0 to 3 inches) samples along the sediment probing transects and mid-transect locations (i.e., T17, T17.5, T18, T18.5, etc. - see Figure 2). Samples will be located ¼, ½, and ¾ distance across the channel at each transect. Grab samples will be collected at each location that a core is not obtained (see above).
  - All samples will be submitted for PCB (congener), TOC, bulk density, moisture content, and grain size analyses.
  - The physical characteristics of each sample will be recorded. These characteristics will include general soil type (sand, silt, clay and organic matter/other matter, as determined using the USCS and approximate grain size (fine, medium, coarse).

### 2.3 Near Shore Areas Between Transects T16 and T21

Sampling will be performed within the near shore areas (i.e., areas with water depths less than 5 feet) between sediment probing Transects T16 and T21. A total of 6 cores will be collected (see Figure 2 for approximate locations). The following provides details regarding collection of these samples.

Core Collection
- Collect 3 cores each along the northern and southern near shores areas (i.e., total of 6 cores) along sediment probing transect T16, T18, and T21 (see Figure 2).
  - Each core will be segmented 0 – 1 cm, 1 cm – 3 inches, 3 – 12 inches, 12 – 24 inches, and every foot thereafter.
  - Segmentation below the 3-inch depth may be altered to conform with stratigraphic boundaries if such boundaries are visible.
  - All samples will be submitted for PCB (congener), TOC, bulk density, moisture content, and grain size analyses.
  - If insufficient volume is available in any segment, grain size analysis will be not be conducted.
  - All cores will be photographed and the physical characteristics of each segment will be recorded. These characteristics will include general soil type (sand, silt, clay and organic matter/other matter, as determined using the USCS and approximate grain size (fine, medium, coarse).

## 3.0 Sampling Protocol

### 3.1 Sediment Sampling Protocol

Each sediment sample location will be located and recorded using differential global positioning system (DGPS) surveying techniques. Sediment cores and grab samples will be collected using Lexan® tubing with a check valve push core apparatus in accordance with the collection protocol described in the *2003 Monitoring Work Plan* (Alcoa, April 2003). If sediment depths preclude core collection using manual techniques, vibracoring techniques may be used (protocol provided in Appendix A.)

Core samples will be advanced through the sediment to refusal. The recovered cores will be segmented as described above in Sections 2.1 through 2.3. The lengths of segments may be altered

if clear stratigraphic divisions are visible. Each core will be visually observed for physical characterization (i.e., color, grain size) with observations recorded. Photographs will be obtained of each core/grab sample intact and during sectioning (if applicable). At each sample collection location, total water depth and total sediment recovered will be measured and recorded in the field log book. All samples will be handled, packaged and shipped according to the protocol described in the *2003 Monitoring Work Plan* (Alcoa, April 2003).

Samples will be submitted to Northeast Analytical (NEA) for PCB (congener), TOC, bulk density, and moisture content analyses; grain size analysis will be performed by the CDM Massena Laboratory; and lead-210 analysis will be conducted by Mass Spec Services.

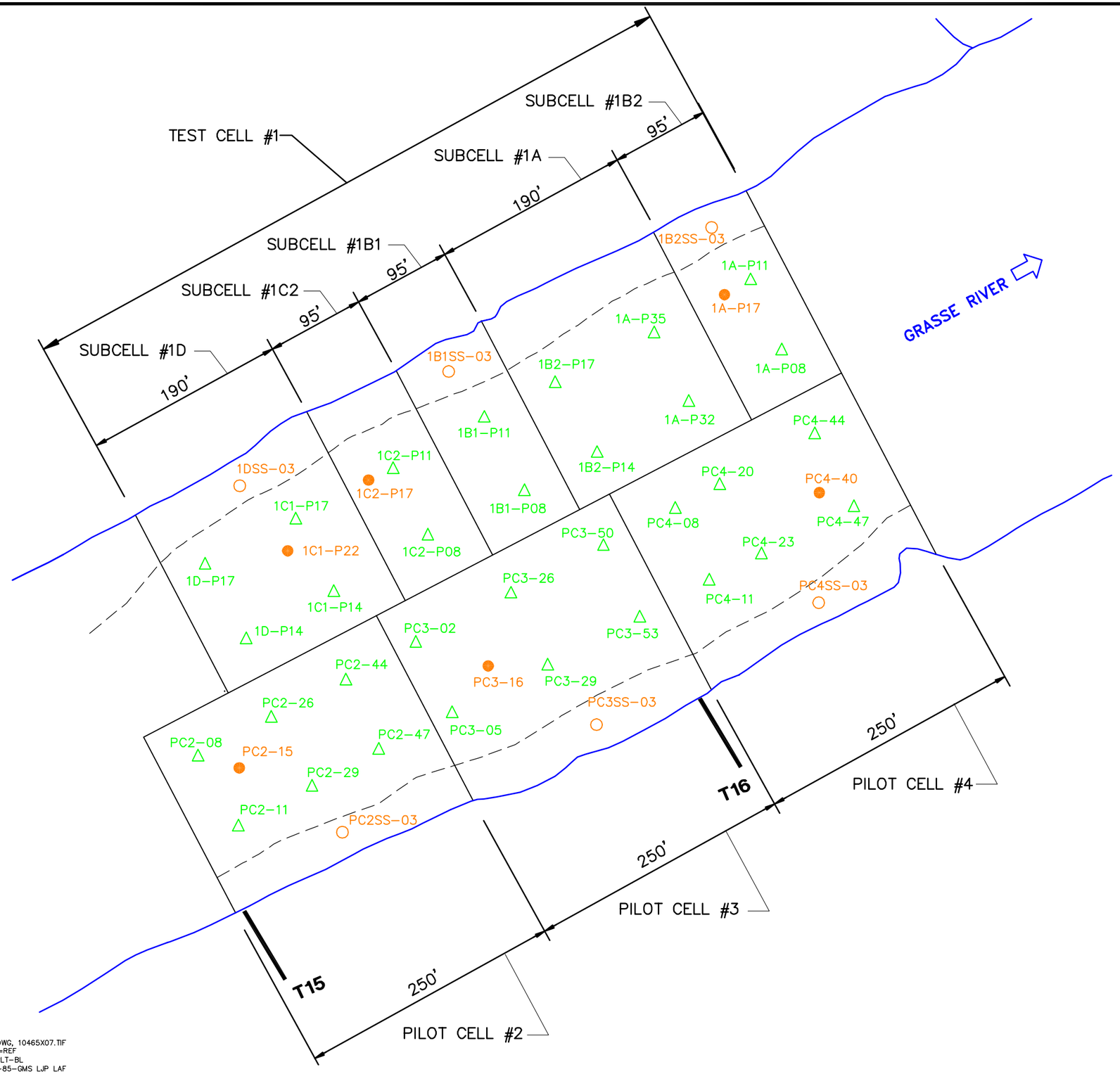
## 4.0 QA/QC Measures

QA/QC samples will include one blind duplicate sample and one matrix spike/matrix spike duplicate (MS/MSD) sample per 20 sediment samples collected. The blind duplicate samples will be analyzed for PCB (congener), TOC, bulk density, moisture content, grain size, and lead-210 analyses. The MS/MSD samples will be analyzed for PCB (congener) and lead-210.

Rinse blank samples will be collected before and after sampling is performed with non-disposable equipment and submitted for PCB (congener) and lead-210 analyses.

## 5.0 References

Alcoa Inc. *2003 Monitoring Work Plan*. April 2003.




LEGEND:

- T15 — 1992 SEDIMENT PROBING TRANSECT LOCATION
- RIVER BOUNDARY
- DIRECTION OF RIVER FLOW
- APPROXIMATE LOCATION OF TOE OF SLOPE
- JUNE 2003 SIDE SLOPE CORE LOCATION
- JUNE 2003 CHANNEL CORE LOCATION
- JUNE 2003 CHANNEL SURFACE SAMPLE LOCATION

**NOTES:**

1. BASE MAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY.

2. ALL LOCATIONS ARE APPROXIMATE.

3. NEAR SHORE SAMPLES WITHIN THE CAPPING PILOT STUDY AREA ARE SHOWN ON FIGURE 2.

0 100' 200'

GRAPHIC SCALE

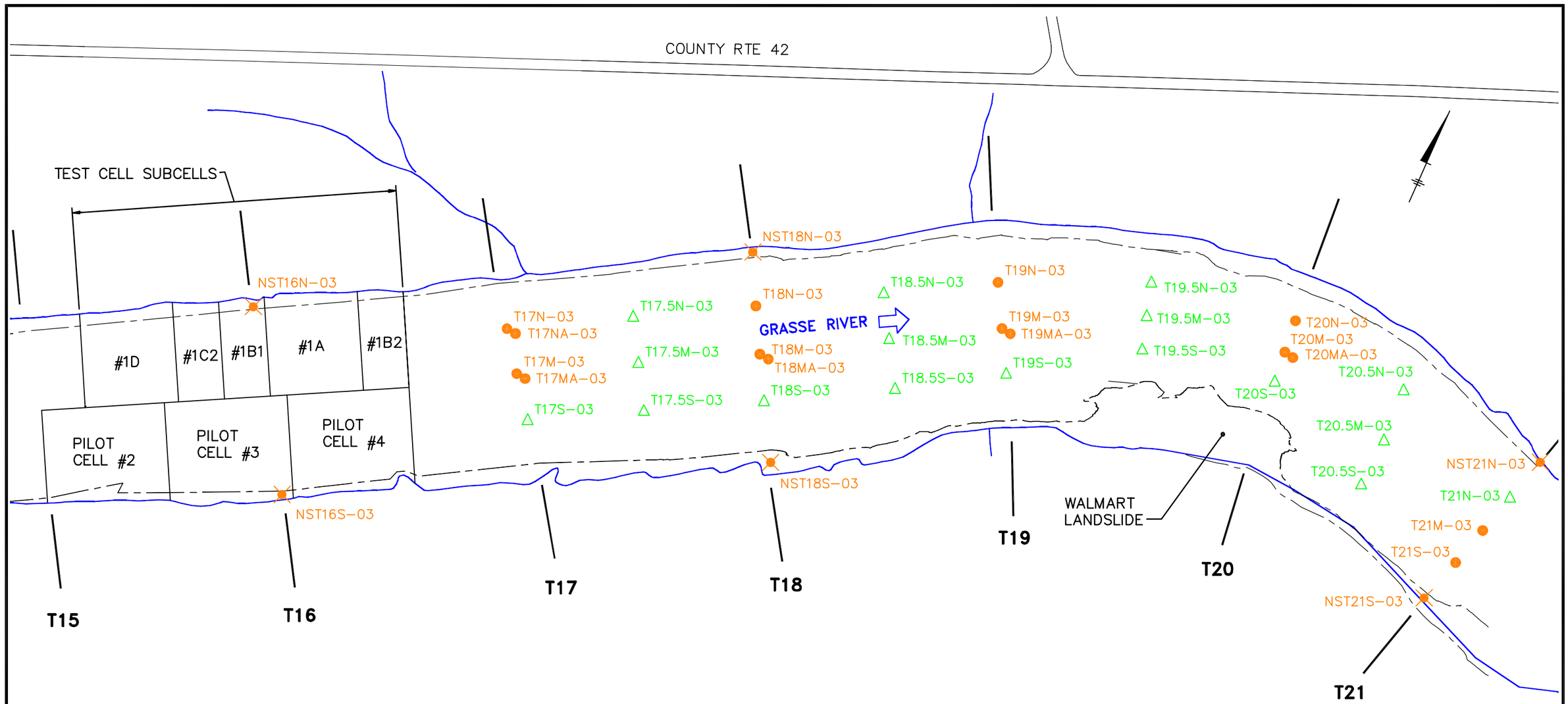
X: 10465X06.DWG, 10465X07.TIF
L: ON=*, OFF=REF
P: PAGESET/PLT-BL
6/19/03 SYR-85-GMS LJP LAF
10465008/10465G07.DWG

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
**CAPPING PILOT STUDY INVESTIGATION**
**PHASE 1 SEDIMENT SAMPLING PLAN**

# PHASE I SEDIMENT SAMPLING LOCATIONS - CAPPING PILOT STUDY AREA

ALCOA

FIGURE **1**




**NOTES:**

1. BASE MAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY.
2. ALL LOCATIONS ARE APPROXIMATE.
3. CAPPING PILOT STUDY AREA SAMPLES ARE SHOWN ON FIGURE 1 WITH THE EXCEPTION OF NEAR SHORE SAMPLES WHICH ARE SHOWN ON THIS FIGURE.
4. EXTENT OF NEAR SHORE AREAS PROVIDED BY QEA ON 10/16/02.

**LEGEND:**

- T19 — 1992 SEDIMENT PROBING TRANSECT LOCATION
- RIVER BOUNDARY
- DIRECTION OF RIVER FLOW
- APPROXIMATE EXTENT OF NEAR SHORE AREA
- JUNE 2003 CHANNEL CORE LOCATION
- JUNE 2003 CHANNEL SURFACE SEDIMENT SAMPLE LOCATION
- JUNE 2003 NEAR SHORE CORE LOCATION

0 200' 400'
GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
**CAPPING PILOT STUDY INVESTIGATION**
**PHASE 1 SEDIMENT SAMPLING PLAN**

# PHASE I SEDIMENT SAMPLING LOCATIONS - T17 TO T21

ALCOA

FIGURE 2

X: 10457X06.DWG, 10457X01.TIF
L: ON=*, OFF=*REF*
P: PAGESET/BL
6/19/03 SYR-85-GMS LJP LAF
10465008/10465G08.DWG

# Appendix A
## Standard Operating Procedures for Vibracore Sediment Collection

### *I. Introduction*

The general procedures to be utilized in obtaining Vibracore sediment samples from the river are outlined below. Lexan® tubing will be the primary method used to collect sediment cores.

### *II. Materials*

- Personal protective equipment (as required by the Health and Safety Plan [BBL, April 2003]);
- Navigation and site maps;
- 16 foot aluminum jon boat equipped with 50HP outboard;
- Vibracoring device (8 HP vibrating apparatus with max. vibrating freq. of 11,000 VPM);
- Lexan® tubing with end caps and appropriate aluminum extension tubes;
- Calibrated rod for sediment depth measurement;
- Six-foot rule and survey rod;
- Duct tape;
- Camera; and
- Field note book.

### *III. Procedures for Sediment Core Collection*

1. Using an on-board DGPS system, maneuver the sampling vessel to within 2 ft of the target sample location. Secure the vessel in place using, anchors, or tie lines.
2. Use a calibrated steel rod to probe the sediment surface 3 to 5 ft downstream from the target location to determine the sediment thickness, type and presence of debris or obstructions.
3. Once the targeted area is deemed suitable for core collection select an appropriate length 3 inch (o.d.) Lexan® core tube based on the probing information.
4. Mount a clean coring tube into the Vibracoring device using extension tubes as necessary.
5. Lower the coring apparatus with the core tube attached vertically through the water column tube end first, until the river bottom is reached.

6. Gently push the core tube into the river bottom while maintaining the apparatus in a vertical position.

7. Vibrate the core into the sediment to refusal. Measure and record the depth of core tube penetration into the sediments in the field book.

8. Pull the apparatus upward out of the river bottom and raise it to the surface, while maintaining the core in a vertical position.

9. Before the bottom of the tube breaks the water surface, place a cap over the bottom to prevent loss of material from the corer. The cap will be placed on the core by reaching down into the water from the sample vessel. Secure the cap in place with duct tape when brought on board the vessel.

10. Water overlying the core tube in the coring apparatus will be allowed to drain prior to removal of the core tube.

11. Estimate the recovered length of the sediment core and note it in the field notebook.

- The length of the cores recovered in Lexan® tubing will be determined by direct measurement.

12. Compare the length of the recovered core with the core penetration depth.

- If the recovered length of the sediment core is more than 75% of the penetration depth, keep the core.
- If insufficient amount of material is recovered, discard the core into a re-sealable 5-gallon pail and store for subsequent disposal by the field processing team. Rinse the core tube with river water and prepare to make an additional attempt.
    - An additional attempt will be made at a minimum distance of 2 ft from the previously attempted location.

.

13. After successful core recovery enter additional information into the field notes.

- Date;
- Time of recovery;
- Sample position;
- Water depth (ft);
- Core tube material (Lexan® tubing);
- Core penetration depth (in); and
- Observation, including probing results.

14. Remove the core tube from the vibracore device and place a second cap on the top of the core tube. Secure the cap in place with duct tape. Rinse the outside of the core tube with a small amount of river water.

15. Draw an arrow on the core tube with permanent marker to mark the top of the core. Label the core with permanent marker indicating station ID, date, and time.

16. Store the core vertically while on the vessel and transport to the processing area.

## *III. References*

Blasland, Bouck & Lee, Inc. (BBL). Health and Safety Plan for Field Activities at the Grasse River Site. April 2003.

**Phase II Grasse River Sampling Work Plan**
**November 2003**

## 1.0 Introduction

This plan presents the components of Phase II of the 2003 Grasse River sampling program initiated in September 2003. Specifically included in this plan are the objectives, sampling locations, sampling protocols, analyses, and quality assurance/quality control (QA/QC) measures associated with each component (as appropriate).

The Phase II program includes the following field activities.

- Installation of river flow and stage monitoring stations, including:
  - A United States Geological Survey (USGS) gaging station; and
  - A staff gage/stage recorder at Outfall 001.
- Underwater survey/bathymetry work, including:
  - Surveying of river and floodplain cross sections;
  - Side-scan sonar and bathymetry surveys;
  - Underwater videotaping; and
  - Sub-bottom profiling.
- Sediment sample collection, including:
  - Cores for stratigraphic/radiometric analyses;
  - Cores and surficial samples for polychlorinated biphenyl (PCB) analyses in the near shore, side slope and main channel areas;
  - Cores for geotechnical analyses; and
  - Bulk treatability study samples.
- Sampling of bank soils.
- Additional tree scar survey work.

Specific components of this program are detailed in the following sections.

## 2.0 Installation of River Flow and Stage Monitoring Stations

### 2.1 USGS Gaging Station

A USGS gaging station will be installed with the objective of obtaining continuous river stage and flow information to allow the USGS to develop a site-specific rating curve for use in future investigative and remedial activities associated with the site. Once this rating curve is established, estimation of Grasse River flow from the Oswagatchie River flow will be discontinued. It is probable that future information to be obtained from the USGS gaging station can be used to evaluate the accuracy of previous estimates using the Oswagatchie River data.

The gage will be installed near Chase Mills, New York, approximately 10 miles upstream of the confluence with the Power Canal. For the first six months of operation, the gage will record stage information only while a rating curve is developed. Once a rating curve is developed, flows will be reported (and can also be determined for the first six months of operation). Flow/stage readings are gathered via satellite every four hours (and every one hour during a high flow period) and reported "real time" on the publicly accessible USGS website (website address: http://ny.waterdata.usgs.gov/nwis/uv/?site_no=04265432&PARAmeter_cd=00065,00060).

## 2.2 Staff Gage/Stage Recorder

A staff gage/stage recorder will be installed at Outfall 001 to provide "local" lower Grasse River stage information. Stage data at this location will allow an assessment of any backwater effects caused by river ice jams.

An ISCO 4230 Bubbler Type meter will be installed in a weather proof housing adjacent to Outfall 001. This meter is an automatic continuous data logger with remote data access. River stage will be recorded at 15-minute intervals from January through June, and at 1-hour intervals from July through December.

# 3.0 Underwater Survey/Bathymetry Work

## 3.1 River and Floodplain Cross Sections

River and floodplain cross sections will be generated using survey elevation data collected in the upstream portion of the Grasse River between Louisville and Massena. The objective of this work is to provide river geometry data needed for ice jam modeling and the analysis of the feasibility of installing an ice control structure in this part of the river.

Thirteen cross sections will be generated – one at each location shown on Figures 1 and 2. Elevational data, water depth, and sediment depth information (where applicable) will be collected in the river and floodplain extending to an elevation of approximately 210 feet mean sea level (MSL). The spacing of survey points along each transect will vary. Where the topography is more variable, survey information will be recorded at approximately 10-foot spacing; where the variation is less (e.g., floodplain areas), survey points will be spaced further apart (e.g., 50- to 100-foot intervals). Locations along each transect will be surveyed using the differential global position system (DGPS).

## 3.2 Side-Scan Sonar and Bathymetry

Side-scan sonar and multi-beam bathymetry will be conducted by Ocean Surveys, Inc. (OSI) to provide baseline information on sediment type and river bed geometry between T38 and T72. This work will be conducted in accordance with the methods utilized for previous OSI surveys performed in 2001 and 2003 (Phase I) (OSI, August 2003). The data will be used as a base of comparison with any surveys deemed necessary in future years.

In addition, OSI will conduct multi-beam bathymetry to collect information on river bed geometry from T1 to T14 and T18 to T38. This work will provide a complete multi-beam bathymetry data set for the river in 2003.

## 3.3 Underwater Videotaping

Underwater videotaping will be performed in the lower river to provide additional visual information (similar to that collected in the Capping Pilot Study [CPS] area during Phase I activities) in select areas that may be important to the evaluation of the impact of the 2003 ice jam on sediments and/or assessment of potential remedial technologies.

Video coverage will be obtained in the following areas:

- ~T4, mid channel;
- ~T6, southern channel;
- ~T15, northern shore;
- ~T18, southern shore; and
- ~T25.5, northern shore.

As described in Section 3.2, Alcoa will collect bathymetric data between T38 and T72. If this work identifies features of potential significance to the evaluation of the 2003 ice jam's impact on sediments or to the assessment of potential remedial technologies, Alcoa will attempt to videotape these areas. It should be recognized, however, that time required for processing the bathymetric data in conjunction with the approaching end of the viable field sampling season in Massena may limit the ability to perform this additional work. Furthermore, the absence of historic bathymetry data in this stretch of river will preclude the identification of areas where the river bottom has been subjected to scour or deposition.

### 3.4 Sub-Bottom Profiling

Stratigraphic bed features indicative of historic ice-jam scour and fill will be assessed through sub-bottom profiling. In addition to identifying stratigraphic features, this work also may identify the presence of sub-bottom features important to the assessment of potential remedial techniques (e.g., sediment type, boulder fields, bedrock features, etc.).

Initially, these techniques will be tested in select areas of the river to determine the ability of the sub-bottom profiling systems to resolve sub-bottom layers similar to those potentially identified in Phase I cores. Both acoustic and electromagnetic systems will be tested. These systems include the Chirp sub-bottom profiling system (to be assessed at varying frequencies) and a ground penetrating radar (GPR) system. This initial work will be conducted in two of the areas selected for stratigraphic core collection (see Section 4.1 for detail). These areas include one area located between T17.5 and T22 and a second area located between T35 and T37.

Should the results of this initial test program indicate that use of one or more of these techniques is viable, a complete river survey will be performed between T1 and T38.

## 4.0 Sediment Sampling

### 4.1 Stratigraphic/Radiometric Analysis

The objective of this portion of the Phase II sampling is to identify any stratigraphic patterns (e.g., sediment interbedding, physical composition, texture, etc.) in sediments that can be used to identify sediments deposited on the river bottom during the 2003 event. These patterns, if observed, will provide a fingerprint of ice-related sediment transport that can be used to evaluate the location, frequency, and severity of past ice jam related scour events.

A total of 23 sediment cores will be collected from areas in which river sediments are known to have accumulated (see Figures 3 through 5), including:

- T5 to T9;
- T17 to T22; and
- T35 to T37.

These core locations were selected based on results of the bathymetric surveys performed during Phase I, and are closely spaced so that the source of the stratigraphic features (i.e., single event or multiple events) can be determined.

These cores will be advanced into the sediments to refusal using vibracore techniques (see Appendix A for procedure). Following collection, cores will be sealed and transported to Pennsylvania State University for cat-scanning to detail the internal sedimentary structure (i.e., thickness, geometry and layering) and texture (i.e., size, shape and orientation) of the sediments. Cores then will be transported back to Massena and opened, split, photographed, and visually observed. Visual characterization will include general soil type (sand, silt, clay, organic matter/other matter), as determined using the Unified Soil Classification System (USCS) and approximate grain size (fine, medium, coarse). Radiometric analyses (i.e., carbon-14 or cesium-137) will be performed on a select number of the stratigraphic cores; the total number of radiometric analyses will depend on the ability to identify clear stratigraphic features (i.e., ice jam beds). These radiometric measurements will help determine the age of the suspected ice jam beds. These dated deposits will then be compared to known ice jam events (as per Phase I tree scar survey or local newspaper accounts).

### 4.2 PCB Analysis

PCB analyses will be performed on sediment cores and surficial (i.e., 0 to 3 inches) sediment grab samples collected throughout the river in the following locations: nearshore areas; along side slopes; in the main channel upstream of the CPS area (T1 to T14); and in the main channel downstream of the CPS area from T21 to T71. The PCB results obtained from these areas will augment data obtained from Phase I and are expected to provide information to:

- Identify, to the extent possible, the potential impacts of ice-related processes on PCB transport and redistribution; and
- Further characterize PCB levels within near shore and side slope sediments throughout the river.

The number, location and depth of collection for samples in near shore, side slope and main channel areas are provided in the following sections (Sections 4.2.1 through 4.2.3). The sampling protocol for sediment collection and the necessary QA/QC measures for all sediment cores also are provided below in Sections 4.5 and 7.0, respectively.

#### 4.2.1 Near Shore Areas

Within the near shore areas (i.e., areas less than 5 feet of water), a total of 10 sediment cores and 28 surficial (i.e., 0 to 3 inches) grab sediment samples will be collected throughout the river beginning at T1. Figures 3 through 7 provide the approximate location of all near shore sediment samples to be collected. The following provides details regarding collection of these sediment samples.

Sample Locations

- Samples will be collected every 2 and 4 transects apart along both the north and south shores between T1 and T15 and T22 and T72, respectively (see Figures 3 through 7).
    - Note that the sample collection locations provided on the figures are approximate, as the exact location will be determined in the field based on water depths encountered.

- Each core will be segmented 0 – 1 centimeter (cm), 1 cm – 3 inches, 3 – 12 inches, and every foot thereafter.
  - Segmentation below the 3-inch depth may be altered to conform with stratigraphic boundaries if such boundaries are visible.
- All samples will be submitted for PCB (Aroclor), TOC, bulk density, moisture content, and grain size analyses.
  - If insufficient volume is available (especially considering the 0 – 1 cm segment), grain size analysis will be not be conducted.
- All cores will be photographed and the physical characteristics within each segment recorded. These characteristics will include general soil type (sand, silt, clay and organic matter/other matter), as determined using the USCS and approximate grain size (fine, medium, coarse).

### 4.2.2 Side Slopes

Sediment cores and surficial grab sediment samples will be collected from representative side slope areas with 3:1 or steeper slopes. The selected side slope sample locations were determined based on the 1992 transect sediment probing information. A total of 12 sediment cores and 6 grab sediment samples will be collected from the side slopes throughout the river. Figures 3 through 7 provide the approximate location of all side slope sediment samples to be collected. The following provides details regarding collection of these samples.

Sample Locations

- Samples will be collected on both the north and south shore between T1 and T15 and T22 and T72 (see Figures 3 through 7).
- Each core will be segmented 0 – 1 cm, 1 cm – 3 inches, 3 – 12 inches, and every foot thereafter.
  - Segmentation below the 3-inch depth may be altered to conform with stratigraphic boundaries if such boundaries are visible.
- All samples will be submitted for PCB (Aroclor), TOC, bulk density, moisture content, and grain size analyses.
  - If insufficient volume is available (especially considering the 0 – 1 cm segment), grain size analysis will be not be conducted.
- All cores will be photographed and the physical characteristics within each segment recorded. These characteristics will include general soil type (sand, silt, clay and organic matter/other matter), as determined using the USCS and approximate grain size (fine, medium, coarse).

### 4.2.3 Main Channel

Low and high resolution sediment cores and surficial sediment grab samples will be collected from throughout the main channel in two areas – T1 to T14 and T21 to T71 – to obtain systematic coverage of these areas for characterization. Sample collection downstream of T27 at specific locations will also provide information for comparison with historic PCB data. Figures 3 through 7 provide the approximate location of all main channel sediment samples to be collected. The following provides details regarding collection of these sediment samples.

Sample Locations

- Upstream of CPS Area – T1 to T14
  - 5 low resolution and 5 high resolution sediment cores, and 32 grab sediment samples will be collected (see Figure 3).

    - Samples will be spaced at ¼, ½, and ¾ of the total river width across each transect.
- Downstream of CPS Area – T21 to T71
    - 24 low resolution and 12 high resolution sediment cores, and 65 grab sediment samples will be collected (see Figures 4 through 7).
    - Samples will be spaced at ¼, ½, and ¾ of the total river width across each transect.

- Low resolution sediment cores will be segmented 0 – 1 cm, 1 cm – 3 inches, 3 – 12 inches, and every foot thereafter.
    - Segmentation below the 3-inch depth may be altered to conform with stratigraphic boundaries if such boundaries are visible.
- High resolution cores will be segmented into 1-cm sections. The top 8 cm (0 – 1 cm, 1 – 2 cm … 7 – 8 cm) and every fifth interval thereafter starting with the 9 – 10 cm section (i.e., 9 – 10 cm, 14 - 15 cm, etc.) will be submitted for analyses.
    - At each high resolution core location, a co-located core will be collected for grain size analysis. The core will be segmented 0 –3 inches, 3 – 12 inches, and every foot thereafter.
        - Segmentation below the 3-inch depth may be altered to conform with stratigraphic boundaries if such boundaries are visible.
- All samples will be submitted for PCB (Aroclor), TOC, bulk density, moisture content, and grain size analyses (except high resolution cores – see above).
    - If insufficient volume is available from the sediment cores (especially considering the 0 – 1 cm segment), grain size analysis will be not be conducted.
- All cores and samples will be photographed and the physical characteristics of each segment recorded. These characteristics will include general soil type (sand, silt, clay and organic matter/other matter), as determined using the USCS and approximate grain size (fine, medium, coarse).

### 4.3 Geotechnical Analysis

Geotechnical analysis will be performed on various sediment cores collected throughout the river to provide additional sediment characterization (e.g., strength parameters, consolidation for evaluation of dredging and capping technologies) to refine existing or develop additional potential remedy techniques/costs for the lower Grasse River sediments. Sediment cores will be collected at multiple locations along 6 transects in areas of differing sediment conditions. Specifically, 3 transects have been selected in each of the two regions of the river where previous shaker studies indicated sediments exhibit different erosional properties – T1 to T16 (coarser sediments) and T16 to T72 (finer sediments). Figures 3 through 6 provide the locations of the geotechnical sampling transects.

Along each transect, 3 sediment cores will be collected to a maximum depth of 5 feet (or less if refusal is encountered) using manual collection techniques as described in Section 4.5. Cores will be transported to the laboratory intact, and the laboratory will segment the cores into three intervals (assuming 5 foot cores): 0 - 12 inches; 12 - 36 inches; and 36 - 60 inches. If 5 feet of sediment are not recovered, the sampling interval may be altered as necessary. Representative samples from each location will undergo moisture content, grain size, consolidation (ASTM D2435), laboratory vane shear (ASTM D4648), undrained and drained direct shear strength (ASTM D3080), consolidated-undrained triaxial compression (ASTM D4767), unconsolidated-undrained triaxial compression (ASTM D2850), specific gravity (ASTM D854), and Atterberg Limits (ASTM D4318) testing. It should be noted that undisturbed samples are required for consolidation and shear strength testing, per the ASTM standards and sample segments for these analyses will be selected accordingly.

The geotechnical laboratory testing specified above can be divided into three categories: index; settlement; and strength testing. Index testing will be performed on the sediment primarily for classification purposes and correlation with engineering properties based on established empirical relationships. Index testing will include: moisture content (ASTM D2216); grain size with hydrometer (ASTM D422); Atterberg limits (ASTM D4318); and specific gravity (ASTM D854).

Grain-size analyses will be performed to develop a grain-size distribution curve that determines, among other things, whether the sediment is coarse grained or fine grained based on the amount of material passing the U.S. No. 200 sieve (<0.075 millimeters). The curve also will provide the information required to classify the sediment according to the USCS. In addition, if the sediment is coarse grained, the shape of the curve will indicate whether the material is well or poorly graded, which can be indicative of strength. This information will be used in conjunction with other grain size analyses that have been performed as part of the Phase I work or will be performed as part of the Phase II sediment sample collection. Atterberg limits testing will be performed to determine the plasticity of the fine-grained portion of the sediment, and the results will be used in conjunction with the grain-size analyses to refine the USCS classification. In addition, the Atterberg limits test results, combined with the moisture content results, will indicate potential structural behavior if the sediment is sheared. Specific gravity testing will be performed to provide the required data to interpret the consolidation test results. In particular, the specific gravity is required to evaluate the change in void ratio. In addition, the results of the specific gravity test should be consistent with the classification determined using the grain size and Atterberg limits test results.

Consolidation testing (ASTM D2435) will be performed to determine the settlement characteristics of the sediment. The parameters measured through consolidation tests (i.e., compression index and time rate of consolidation) can be used to estimate the time rate and magnitude of settlement resulting from the placement of a potential cap system.

The strength characteristics of the soil will be established through laboratory vane shear (ASTM D4648), undrained direct shear (ASTM D3080), drained direct shear (ASTM D3080), consolidated-undrained (CU) triaxial compression (ASTM D4767), and/or unconsolidated-undrained (UU) triaxial compression (ASTM D2850) testing. The strength characteristics will be used to evaluate sediment stability. The type of strength test to be conducted in the laboratory will depend on visual soil classification following sample collection. For coarse-grained material, only the drained direct shear test likely would be performed; whereas, if the material is more fine grained, some or all of the remaining tests may be required. If the material is fine grained, data from the vane shear, undrained direct shear, and/or UU tests are generally used to estimate short-term stability, and data from the CU tests are typically used for long-term analyses; however, if the material is coarse grained, the same strength parameters will apply for both short-term and long-term stability.

Close coordination with the laboratory will be necessary to select appropriate analyses for each of the cores collected.

### 4.4 Treatability Studies

Treatability study samples will be collected from the Grasse River to assess issues related to the feasibility of various remedial options for the river. Representative bulk sediment samples will be collected from the following general locations (listed in order of priority):

- Horton Road area (T18 to T20.5);

- T34 to T38;
- Unnamed Tributary area (T26 to T28.5);
- T6 to T8;
- Dennison Road area (T11 to T14);
- T31 to T33;
- T55 to T56; and
- T67.

Bulk sediment samples will be collected from each location using the core collection techniques described in Section 4.5 in order to obtain samples representative of the full depth of the sediment column. The sediments from the recovered core will then be placed into an appropriately-sized container and composited. These samples will then be submitted for treatability testing to assess various sediment properties related to materials handling and dewatering.

### 4.5 Sediment Sampling Protocol

Each sediment sample location will be located and recorded using DGPS surveying techniques. Sediment cores and grab samples will be collected using Lexan® tubing with a check valve push core apparatus in accordance with the collection protocol described in the *2003 Monitoring Work Plan* (Alcoa, April 2003). If sediment depths preclude core collection using manual techniques (especially considering the stratigraphic/radiometric cores), vibracoring techniques will be used (protocol provided in Appendix A).

Core samples will be advanced through the sediment to refusal. The recovered cores will be segmented as described above in Sections 4.1 and 4.3. The lengths of segments may be altered if clear stratigraphic divisions are visible. Each core will be visually observed for physical characterization (i.e., color, grain size) with observations recorded. Photographs will be obtained of each core/grab sample intact and during sectioning (if applicable). At each sample collection location, total water depth and total sediment recovered measured and recorded in the field log book. All samples will be handled, packaged and shipped according to the protocol described in the *2003 Monitoring Work Plan* (Alcoa, April 2003).

Samples will be transported to various laboratories for the required analytical tests as outlined in Sections 4.1 through 4.4, including:

- Northeast Analytical (NEA) in Schenectady, New York for PCB (Aroclor), TOC, bulk density, and moisture content analyses;
- Pennsylvania State University for radiometric analysis;
- Camp Dresser & McKee (CDM) Soils Laboratory in Cambridge, Massachusetts for grain size analysis and geotechnical analyses; and
- Waste Stream Technology in Buffalo, NY for treatability study analyses.

## 5.0 Bank Sampling

Bank samples will be collected throughout the lower Grasse River along a total of 24 transects (see Figures 8 through 10 for approximate locations). Transects will be located either on Alcoa property or within Alcoa flowage rights. Transects either 5 or 10 feet in length will be located perpendicular to the river (distances for each transect are provided on the attached figures). The starting point of each transect (i.e., 0 feet) will be located at the beginning of upland vegetation. It is recognized that this starting point for the transect locations in the wetland areas may need to be adjusted in the field based on conditions specific to each transect**.**

A total of three discrete soil samples will be collected along each transect at 1, 3, and 5 feet (for transects of 5 feet) and 1, 5, and 10 feet (for transects of 10 feet). The three discrete soil samples along each transect will be collected from a depth of 0 to 3 inches and composited to make one representative sample for analysis per transect. The composite soil samples will be submitted to NEA for PCB (Aroclor) and TOC analysis. The necessary QA/QC measures for all soil samples are provided below in Section 7.0.

## 6.0 Additional Tree Scar Survey

Additional tree scar field survey work will be conducted in conjunction with the river and floodplain cross section survey work in the upstream portion of the river. The objective of the survey will be to observe and document ice damage to trees along the banks of the Grasse River. Documentation would include both photographic documentation and quantitative field measurements.

Specific data collection objectives are as follows:

- Tree scar location;
- Severity of tree scar;
- Elevation of top and bottom of scar; and
- Collection of samples from selected scarred trees for use in dating of scars. Sample collection would be obtained via small diameter cores and/or cross sections of ice damaged trees.

The information collected during this survey will compliment the available tree scar data and be utilized in the evaluation of the frequency, severity and location and nature of ice jams within the Grasse River.

## 7.0 QA/QC Measures

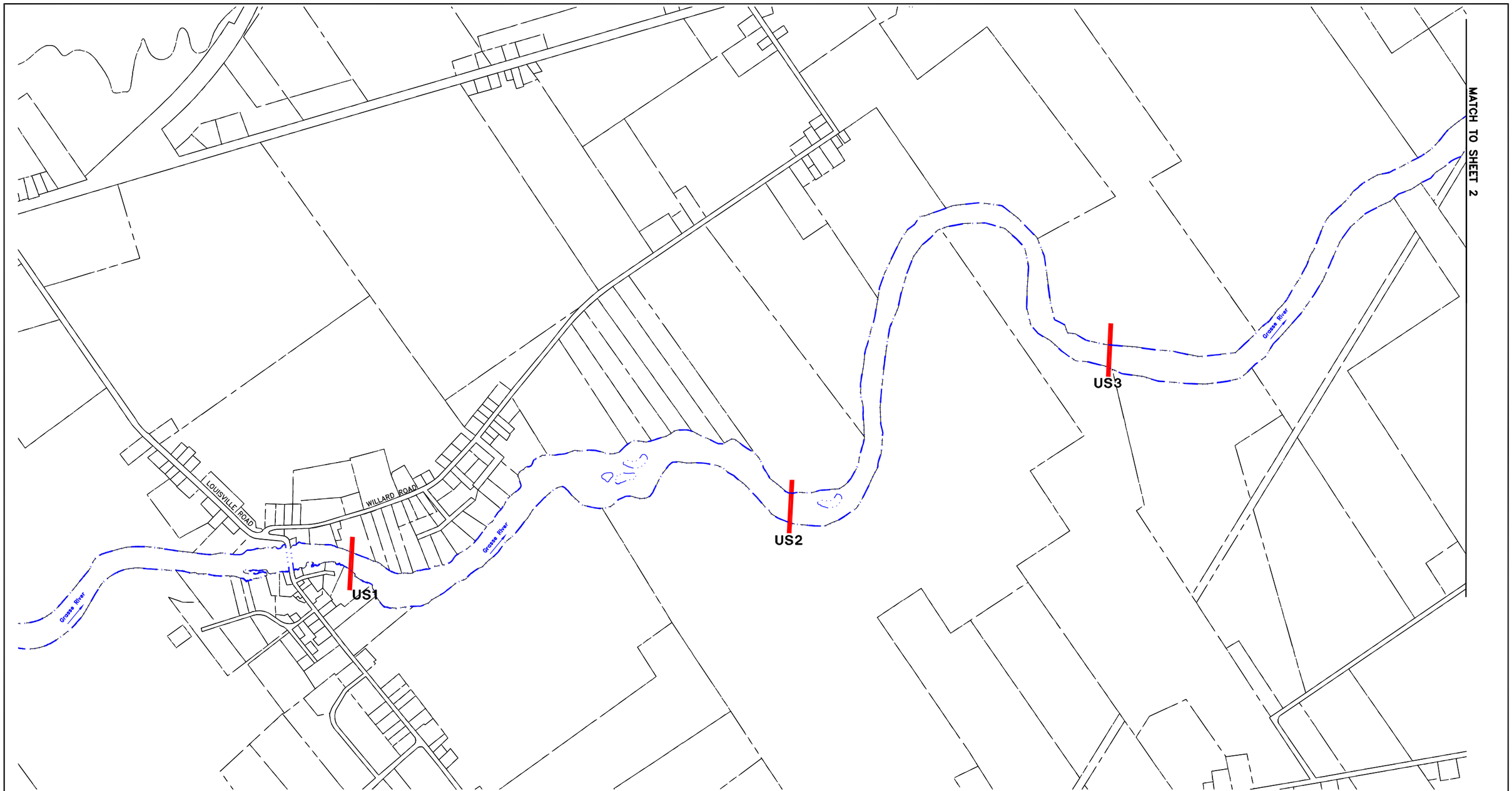
Consistent with the Phase I program, QA/QC samples will include one blind duplicate sample and one matrix spike/matrix spike duplicate (MS/MSD) sample per 20 samples collected. The blind duplicate sediment samples will be analyzed for PCB (Aroclor), TOC, bulk density, moisture content, and grain size analyses. The blind duplicate soil samples will be analyzed for PCB (Aroclor) and TOC. The MS/MSD samples will be analyzed for PCB (Aroclor).

Rinse blank samples will be collected before and after sampling is performed with non-disposable equipment and submitted for PCB (Aroclor).

## 8.0 References

Alcoa Inc. *2003 Monitoring Work Plan*. April 2003.

Ocean Surveys, Inc. *Final Report. Remote Sensing Survey Grass River Investigation T1 to T38*. 28 August 2003.




LEGEND:

US1 — APPROXIMATE UPSTREAM CROSS-SECTION LOCATION

NOTES:

1. BASEMAP INFORMATION OBTAINED FROM A FIGURE BY CAMP DRESSER & MCKEE ENTITLED "ALCOA, INC. – MASSENA OPERATIONS – WEST PLANT" DATED AUGUST 1, 2003.

2. PROPERTY INFORMATION OBTAINED FROM ST. LAWRENCE COUNTY REAL PROPERTY DATA FOR 2000.

0 500' 1000'
GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
PHASE II SAMPLING WORK PLAN

# UPSTREAM CROSS SECTION LOCATIONS

ALCOA

FIGURE 1

X: 10471X06.DWG, 10471X01.TIF
L: ON=*, OFF=*REF*
P: PAGESET/PLT-DL
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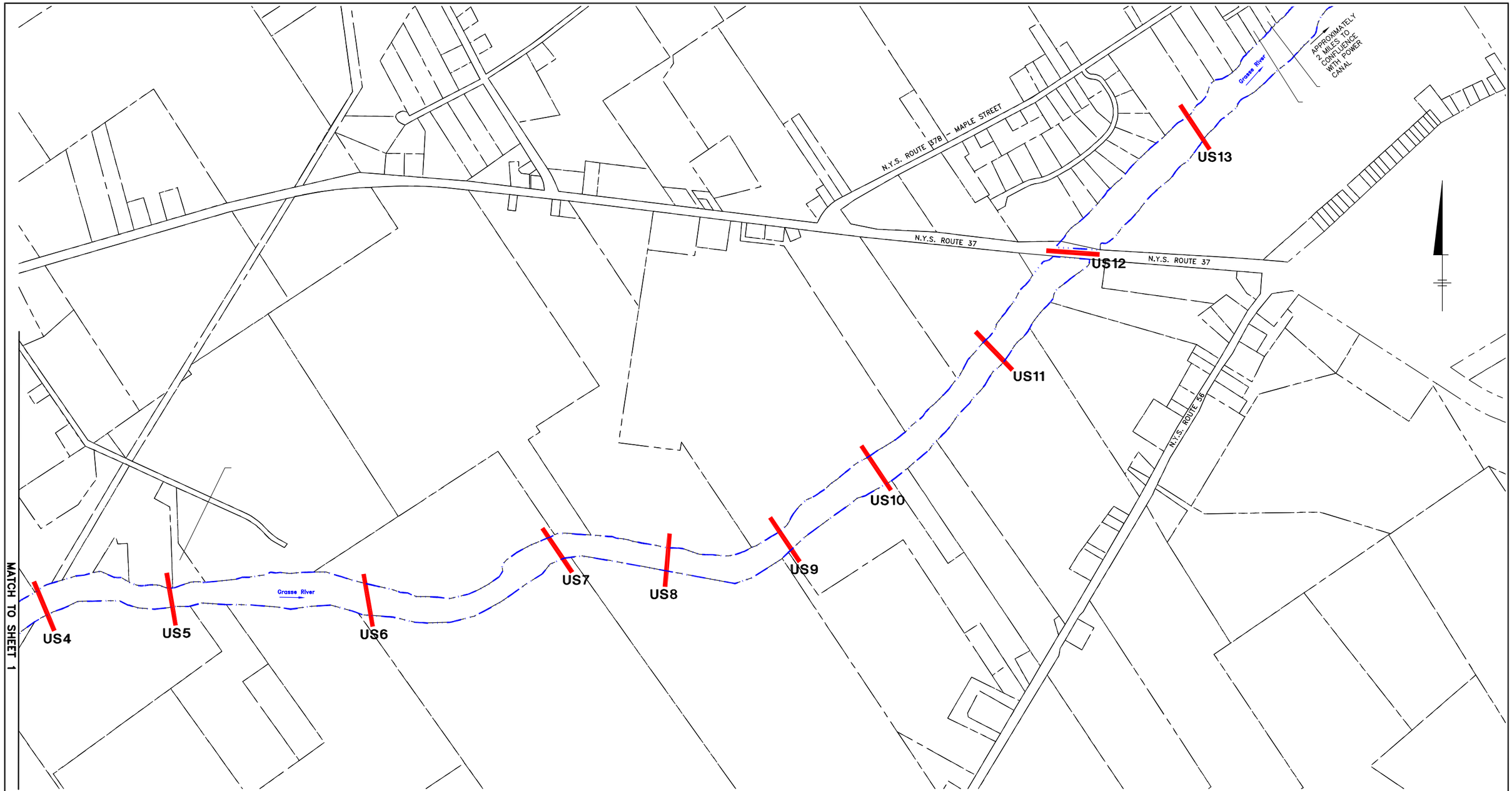


LEGEND:

US4 — APPROXIMATE UPSTREAM CROSS-SECTION LOCATION

NOTES:

1. BASEMAP INFORMATION OBTAINED FROM A FIGURE BY CAMP DRESSER & MCKEE ENTITLED "ALCOA, INC. – MASSENA OPERATIONS – WEST PLANT" DATED AUGUST 1, 2003.

2. PROPERTY INFORMATION OBTAINED FROM ST. LAWRENCE COUNTY REAL PROPERTY DATA FOR 2000.

0 500' 1000'
GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
PHASE II SAMPLING WORK PLAN

# UPSTREAM CROSS SECTION LOCATIONS

ALCOA

FIGURE 2

X: 10471X06.DWG, 10471X01.TIF
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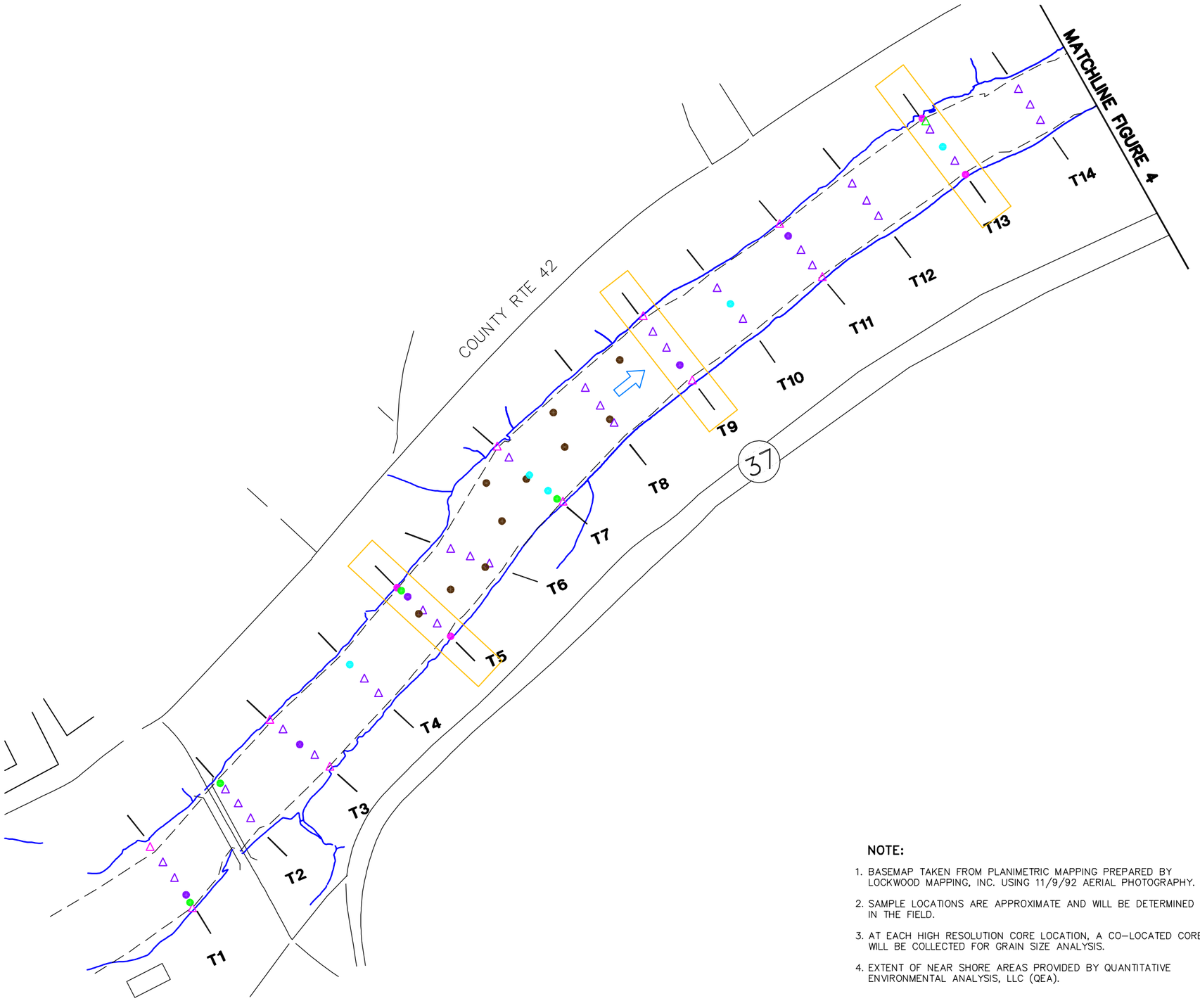



**LEGEND:**

- 2003 PHASE II CHANNEL SURFACE SEDIMENT SAMPLE LOCATION
- 2003 PHASE II NEAR SHORE SURFACE SEDIMENT LOCATION
- 2003 PHASE II SIDE SLOPE SURFACE SEDIMENT LOCATION
- 2003 PHASE II LOW RESOLUTION CORE LOCATION
- 2003 PHASE II HIGH RESOLUTION CORE LOCATION
- 2003 PHASE II NEAR SHORE CORE LOCATION
- 2003 PHASE II SIDE SLOPE CORE LOCATION
- 2003 PHASE II STRATIGRAPHIC CORE LOCATION
- 2003 PHASE II GEOTECHNICAL SAMPLING TRANSECT
- T35 — 1992 SEDIMENT PROBING TRANSECT
- NEAR SHORE AREA
- DIRECTION OF RIVER FLOW

**NOTE:**

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY.
2. SAMPLE LOCATIONS ARE APPROXIMATE AND WILL BE DETERMINED IN THE FIELD.
3. AT EACH HIGH RESOLUTION CORE LOCATION, A CO-LOCATED CORE WILL BE COLLECTED FOR GRAIN SIZE ANALYSIS.
4. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).

0 600' 1200'

GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

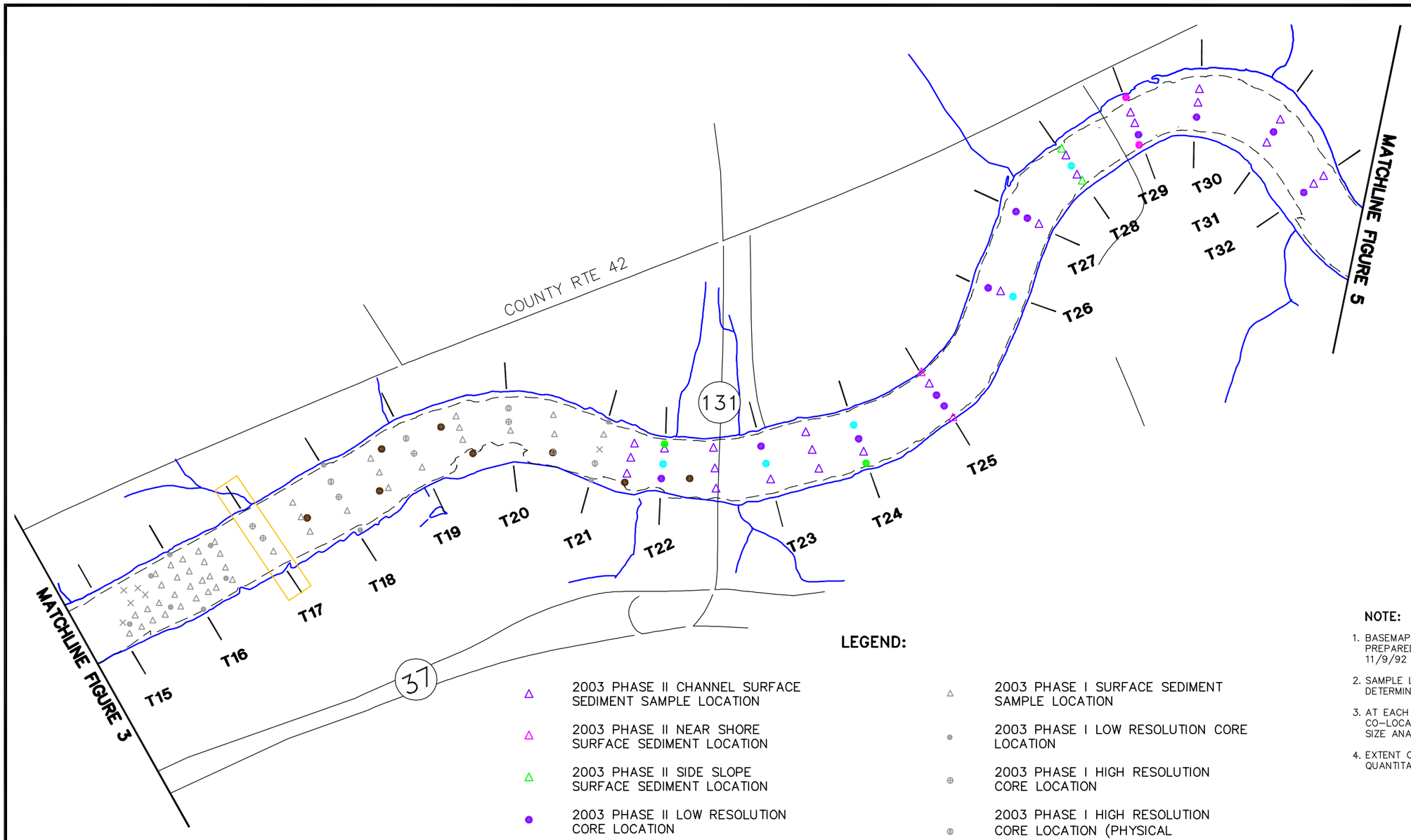
**PHASE II SAMPLING WORK PLAN**

# SEDIMENT SAMPLING LOCATIONS T1 - T14

ALCOA

FIGURE **3**

X: 10471X04.DWG, 10471X01.TIF
L: ON=*, OFF=*REF*
P: PAGESET/PLT-BL
11/7/03 SYR-85-CBM DJP LAF
10471002/10471G12.DWG




**LEGEND:**

- 2003 PHASE II CHANNEL SURFACE SEDIMENT SAMPLE LOCATION
- 2003 PHASE II NEAR SHORE SURFACE SEDIMENT LOCATION
- 2003 PHASE II SIDE SLOPE SURFACE SEDIMENT LOCATION
- 2003 PHASE II LOW RESOLUTION CORE LOCATION
- 2003 PHASE II HIGH RESOLUTION CORE LOCATION
- 2003 PHASE II NEAR SHORE CORE LOCATION
- 2003 PHASE II SIDE SLOPE CORE LOCATION
- 2003 PHASE II STRATIGRAPHIC CORE LOCATION
- 2003 PHASE I SURFACE SEDIMENT SAMPLE LOCATION
- 2003 PHASE I LOW RESOLUTION CORE LOCATION
- 2003 PHASE I HIGH RESOLUTION CORE LOCATION
- 2003 PHASE I HIGH RESOLUTION CORE LOCATION (PHYSICAL PARAMETERS ONLY)
- 2003 PHASE I SAMPLE LOCATION – NO SEDIMENT RECOVERED
- 2003 PHASE II GEOTECHNICAL SAMPLING TRANSECT
- T35 — 1992 SEDIMENT PROBING TRANSECT
- NEAR SHORE AREA
- DIRECTION OF RIVER FLOW

**NOTE:**

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY.
2. SAMPLE LOCATIONS ARE APPROXIMATE AND WILL BE DETERMINED IN THE FIELD.
3. AT EACH HIGH RESOLUTION CORE LOCATION, A CO-LOCATED CORE WILL BE COLLECTED FOR GRAIN SIZE ANALYSIS.
4. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).

0 600' 1200'

GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

**PHASE II SAMPLING WORK PLAN**

# SEDIMENT SAMPLING LOCATIONS T15 - T32

ALCOA

FIGURE **4**

X: 10471X04.DWG, 10471X01.TIF
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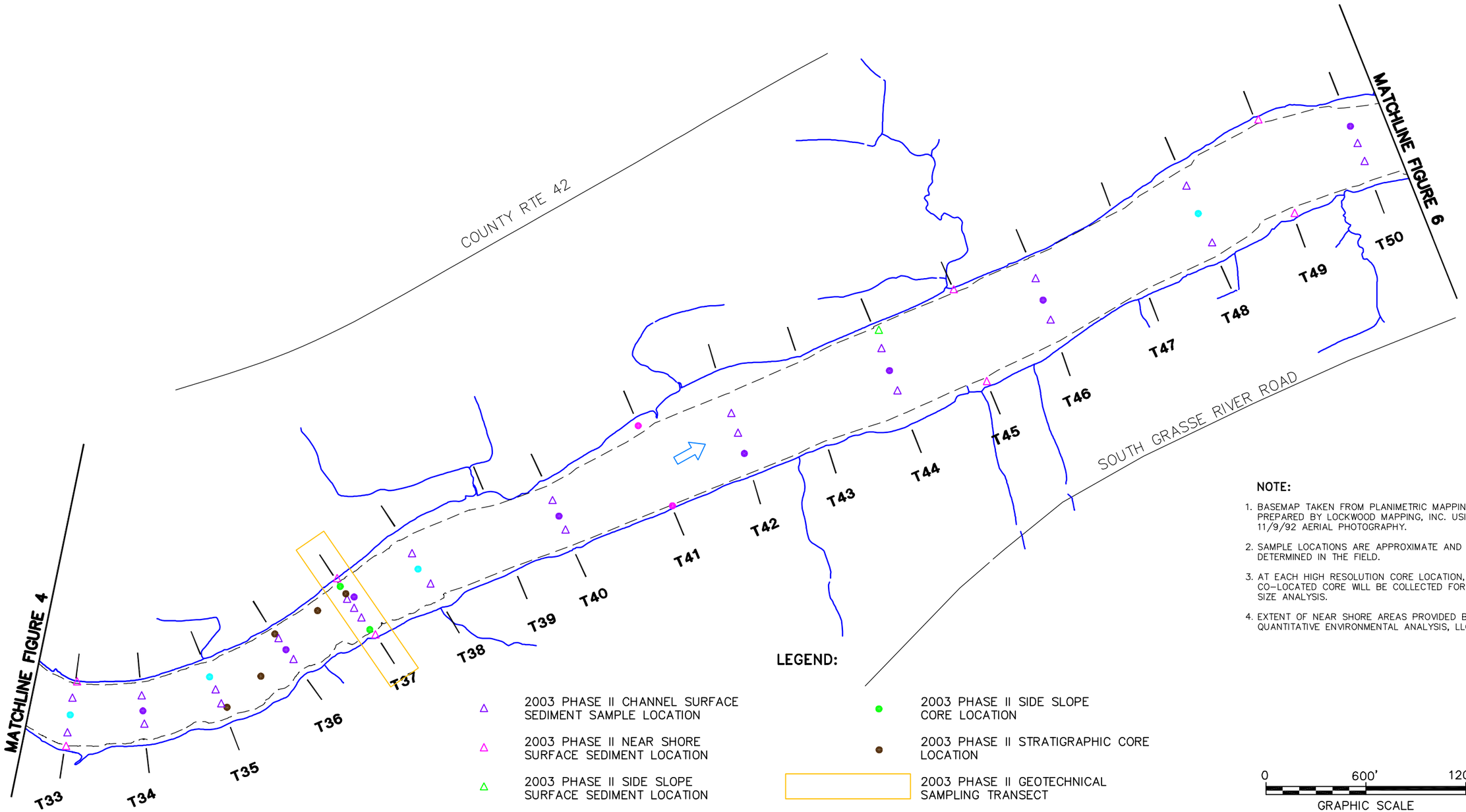


**NOTE:**

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY.
2. SAMPLE LOCATIONS ARE APPROXIMATE AND WILL BE DETERMINED IN THE FIELD.
3. AT EACH HIGH RESOLUTION CORE LOCATION, A CO-LOCATED CORE WILL BE COLLECTED FOR GRAIN SIZE ANALYSIS.
4. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).

**LEGEND:**

- 2003 PHASE II CHANNEL SURFACE SEDIMENT SAMPLE LOCATION
- 2003 PHASE II NEAR SHORE SURFACE SEDIMENT LOCATION
- 2003 PHASE II SIDE SLOPE SURFACE SEDIMENT LOCATION
- 2003 PHASE II LOW RESOLUTION CORE LOCATION
- 2003 PHASE II HIGH RESOLUTION CORE LOCATION
- 2003 PHASE II NEAR SHORE CORE LOCATION
- 2003 PHASE II SIDE SLOPE CORE LOCATION
- 2003 PHASE II STRATIGRAPHIC CORE LOCATION
- 2003 PHASE II GEOTECHNICAL SAMPLING TRANSECT
- T35 — 1992 SEDIMENT PROBING TRANSECT
- NEAR SHORE AREA
- DIRECTION OF RIVER FLOW

0 600' 1200'

GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

**PHASE II SAMPLING WORK PLAN**

# SEDIMENT SAMPLING LOCATIONS T33 - T50

ALCOA

FIGURE **5**

X: 10471X04.DWG, 10471X01.TIF
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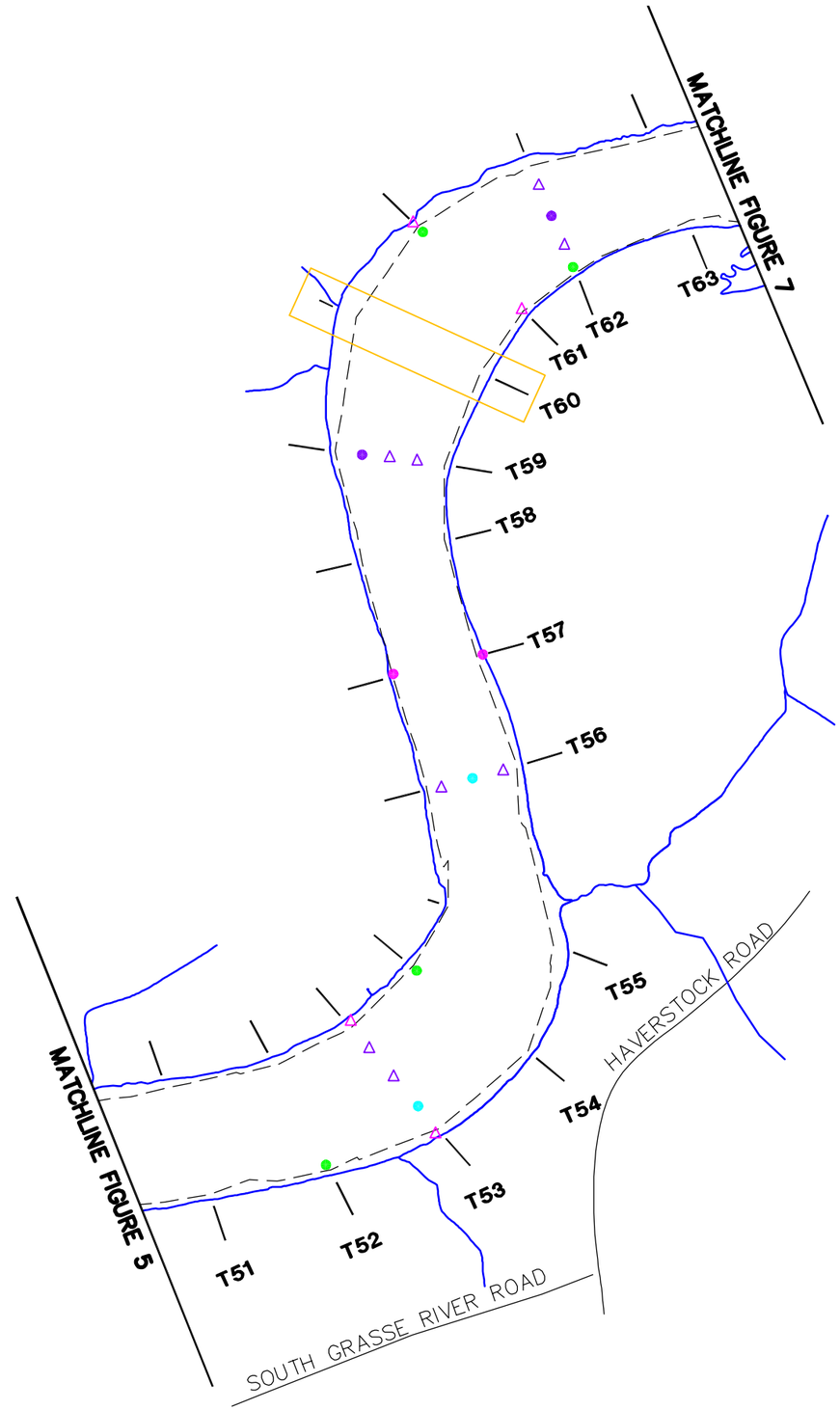
10471002/10471G15.DWG




**LEGEND:**

- 2003 PHASE II CHANNEL SURFACE SEDIMENT SAMPLE LOCATION
- 2003 PHASE II NEAR SHORE SURFACE SEDIMENT SAMPLE LOCATION
- 2003 PHASE II LOW RESOLUTION CORE LOCATION
- 2003 PHASE II HIGH RESOLUTION CORE LOCATION
- 2003 PHASE II NEAR SHORE CORE LOCATION
- 2003 PHASE II SIDE SLOPE CORE LOCATION
- 2003 PHASE II GEOTECHNICAL SAMPLING TRANSECT
- T35 — 1992 SEDIMENT PROBING TRANSECT
- NEAR SHORE AREA
- DIRECTION OF RIVER FLOW

**NOTE:**

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY.
2. SAMPLE LOCATIONS ARE APPROXIMATE AND WILL BE DETERMINED IN THE FIELD.
3. AT EACH HIGH RESOLUTION CORE LOCATION, A CO-LOCATED CORE WILL BE COLLECTED FOR GRAIN SIZE ANALYSIS.
4. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).

0 600' 1200'

GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

**PHASE II SAMPLING WORK PLAN**

# SEDIMENT SAMPLING LOCATIONS T51 - T63

ALCOA

FIGURE **6**

X: 10471X04.DWG, 10471X01.TIF
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P: PAGESET/PLT-BL
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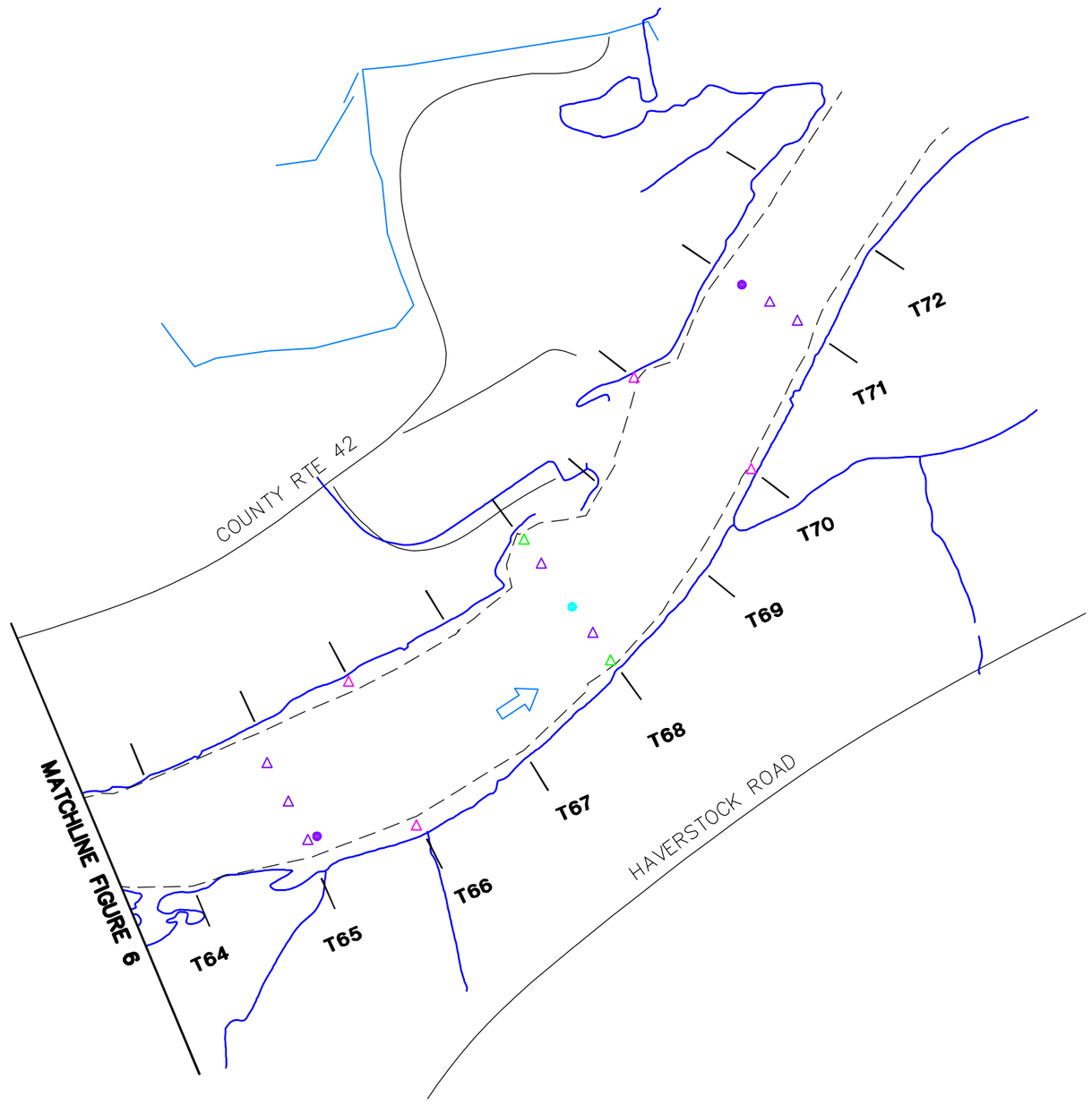
10471002/10471G16.DWG




**LEGEND:**

- 2003 PHASE II CHANNEL SURFACE SEDIMENT SAMPLE LOCATION
- 2003 PHASE II NEAR SHORE SURFACE SEDIMENT SAMPLE LOCATION
- 2003 PHASE II SIDE SLOPE SURFACE SEDIMENT LOCATION
- 2003 PHASE II LOW RESOLUTION CORE LOCATION
- 2003 PHASE II HIGH RESOLUTION CORE LOCATION
- 2003 PHASE II NEAR SHORE CORE LOCATION
- 1992 SEDIMENT PROBING TRANSECT
- NEAR SHORE AREA
- T35
- DIRECTION OF RIVER FLOW

**NOTE:**

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY.
2. SAMPLE LOCATIONS ARE APPROXIMATE AND WILL BE DETERMINED IN THE FIELD.
3. AT EACH HIGH RESOLUTION CORE LOCATION, A CO-LOCATED CORE WILL BE COLLECTED FOR GRAIN SIZE ANALYSIS.
4. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).

0 600' 1200'

GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

**PHASE II SAMPLING WORK PLAN**

# SEDIMENT SAMPLING LOCATIONS T64 - T72

ALCOA

FIGURE **7**

X: 10471X04.DWG, 10471X01.TIF
L: ON=*, OFF=*REF*
P: PAGESET/PLT-BL
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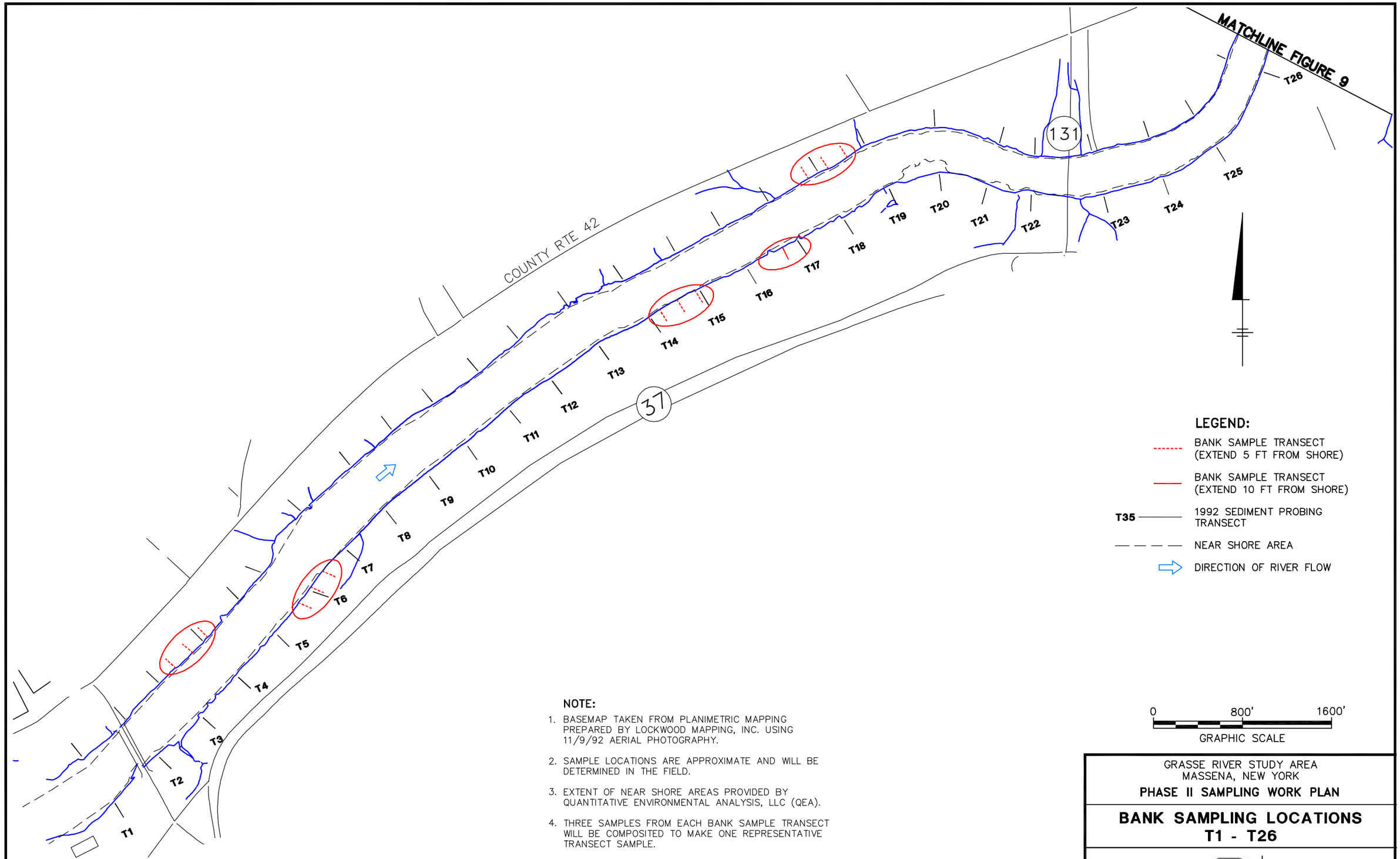


**LEGEND:**

- BANK SAMPLE TRANSECT (EXTEND 5 FT FROM SHORE)
- BANK SAMPLE TRANSECT (EXTEND 10 FT FROM SHORE)
- T35 — 1992 SEDIMENT PROBING TRANSECT
- NEAR SHORE AREA
- DIRECTION OF RIVER FLOW

**NOTE:**

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY.
2. SAMPLE LOCATIONS ARE APPROXIMATE AND WILL BE DETERMINED IN THE FIELD.
3. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).
4. THREE SAMPLES FROM EACH BANK SAMPLE TRANSECT WILL BE COMPOSITED TO MAKE ONE REPRESENTATIVE TRANSECT SAMPLE.

0 800' 1600'

GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

**PHASE II SAMPLING WORK PLAN**

# BANK SAMPLING LOCATIONS T1 - T26

ALCOA

FIGURE **8**

X: 10471X04.DWG, 10471X01.TIF
L: ON=*, OFF=*REF*
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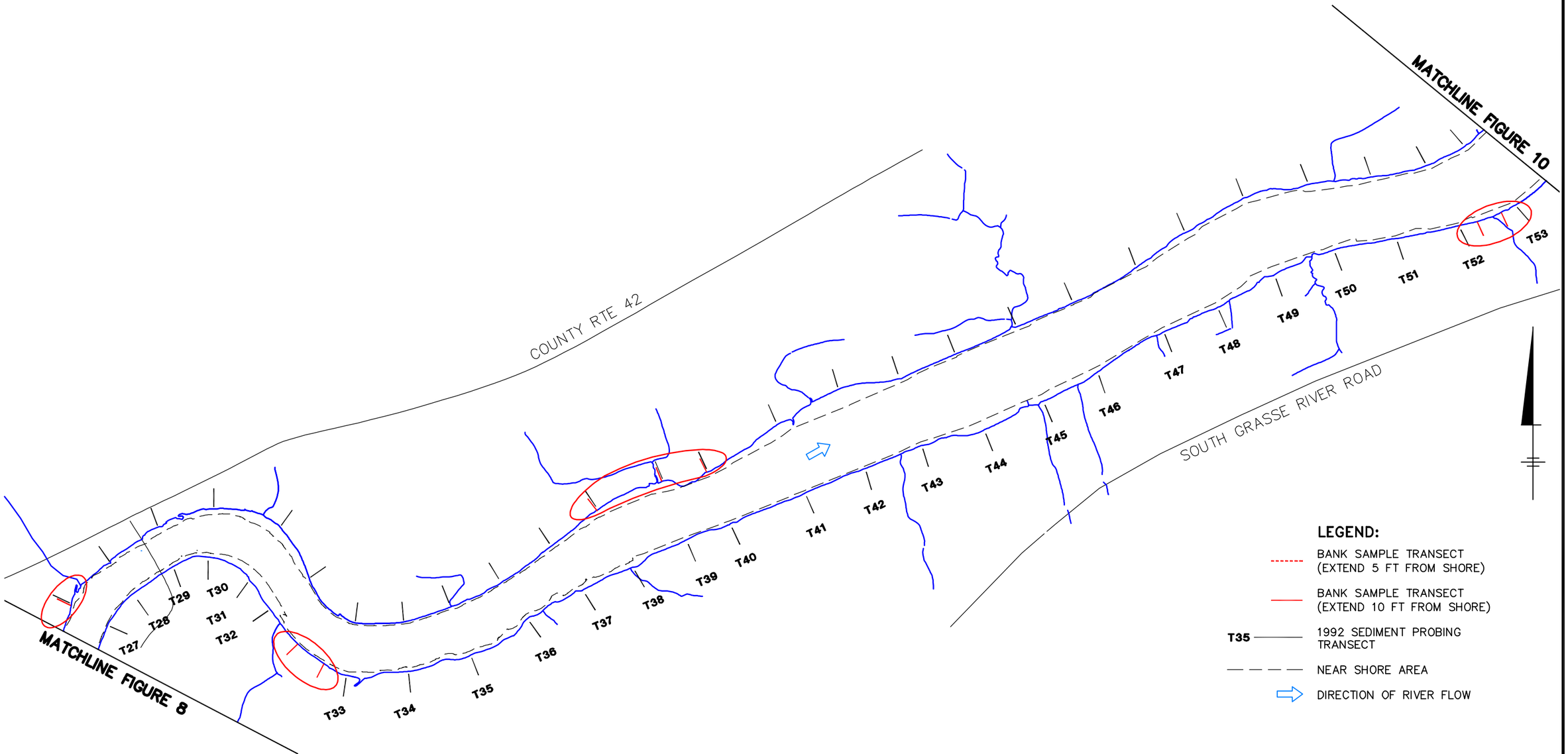


**LEGEND:**

- BANK SAMPLE TRANSECT (EXTEND 5 FT FROM SHORE)
- BANK SAMPLE TRANSECT (EXTEND 10 FT FROM SHORE)
- T35 — 1992 SEDIMENT PROBING TRANSECT
- NEAR SHORE AREA
- DIRECTION OF RIVER FLOW

**NOTE:**

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY.
2. SAMPLE LOCATIONS ARE APPROXIMATE AND WILL BE DETERMINED IN THE FIELD.
3. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).
4. THREE SAMPLES FROM EACH BANK SAMPLE TRANSECT WILL BE COMPOSITED TO MAKE ONE REPRESENTATIVE TRANSECT SAMPLE.

0 800' 1600'

GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

**PHASE II SAMPLING WORK PLAN**

# BANK SAMPLING LOCATIONS T27 - T53

ALCOA

FIGURE **9**

X: 10471X04.DWG, 10471X01.TIF
L: ON=*, OFF=*REF*
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11/5/03 SYR-85-CBM DJP LAF
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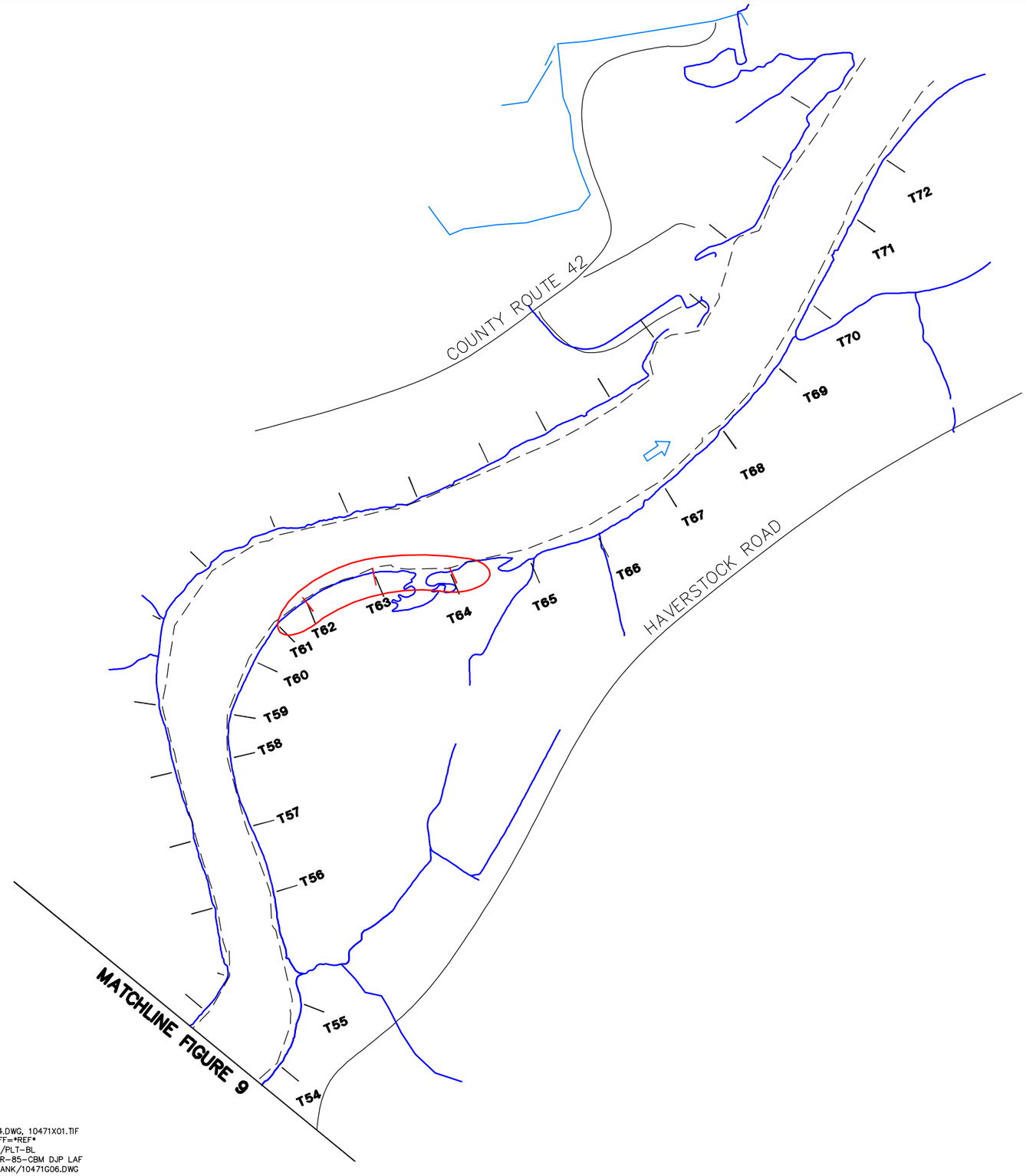



**LEGEND:**

- BANK SAMPLE TRANSECT (EXTEND 5 FT FROM SHORE)
- BANK SAMPLE TRANSECT (EXTEND 10 FT FROM SHORE)
- T35 — 1992 SEDIMENT PROBING TRANSECT
- NEAR SHORE AREA
- DIRECTION OF RIVER FLOW

**NOTE:**

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY.
2. SAMPLE LOCATIONS ARE APPROXIMATE AND WILL BE DETERMINED IN THE FIELD.
3. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).
4. THREE SAMPLES FROM EACH BANK SAMPLE TRANSECT WILL BE COMPOSITED TO MAKE ONE REPRESENTATIVE TRANSECT SAMPLE.

0 800' 1600'

GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

**PHASE II SAMPLING WORK PLAN**

# BANK SAMPLING LOCATIONS T54 - T72

ALCOA

FIGURE 10

X: 10471X04.DWG, 10471X01.TIF
L: ON=*, OFF=*REF*
P: PAGESET/PLT-BL
11/5/03 SYR-85-CBM DJP LAF
10471002/BANK/10471G06.DWG

# Appendix A
## Standard Operating Procedures for Vibracore Sediment Collection

### *I. Introduction*

The general procedures to be utilized in obtaining Vibracore sediment samples from the river are outlined below. Aluminum or Lexan® tubing will be the primary method used to collect sediment cores.

Following collection, the sediment cores will be transferred to a processing area.

### *II. Materials*

- Personal protective equipment (as required by the Health and Safety Plan [BBL, 2003]);
- Navigation and/or site maps;
- 24 foot aluminum decked boat equipped with 90HP outboard;
- Vibracoring device (Rossfelder P-3C);
- Lexan® and aluminum tubing with end caps;
- Calibrated rod for sediment depth measurement;
- Six-foot rule and survey rod;
- Duct tape;
- Camera; and
- Field note book.

### *III. Procedures for Sediment Core Collection*

1. Maneuver the sampling vessel to within 2 ft of the target sample location. Secure the vessel in place using spuds, anchors, or tie lines.

2. Use a calibrated steel rod to probe the sediment surface 3 to 5 ft away from the target location to determine the sediment thickness, type and presence of debris or obstructions.

3. Once the targeted area is deemed suitable for core collection select an appropriate 3 inch (o.d.) core tube type (Lexan® or aluminum) and length based on the probing information. Use Lexan® tubing in soft sediments and aluminum tubing for coarse sediments. Deeper sediments will be sampled with core tubes custom cut on the boat from 12 ft tube sections.

4. Mount a clean coring tube into the Vibracoring device.

5. Lower the coring apparatus with the core tube attached vertically through the water column tube end first, until the river bottom is reached.

6. Vibrate the core into the sediment to refusal. Measure and record the depth of core tube penetration into the sediments in the field book.

7. Pull the apparatus upward out of the river bottom (using a winch), and raise it to the surface, while maintaining the core in a vertical position.

8. Before the bottom of the tube breaks the water surface, place a cap over the bottom to prevent loss of material from the corer. The cap will be placed on the core by reaching down into the water from the center of the sample vessel. Secure the cap in place with duct tape when brought on board the vessel.

9. Water overlying the core tube in the coring apparatus will be allowed to drain prior to removal of the core tube.

10. Estimate the recovered length of the sediment core and note it in the field notebook.

    - The length of the cores recovered in Lexan® tubing will be determined by direct measurement.
    - The length of the cores recovered in aluminum tubing will be determined indirectly by tapping the core with metal rod from the top of the bottom. The spot where the pitch of the sound changes corresponds to the approximate top of the recovered core.

      The distance between the top of the sediment in the core tube and the bottom of the coring tube corresponds to the estimated length of the recovered core.

11. Compare the length of the recovered core with the core penetration depth.

    - If the recovered length of the sediment core is more than 60 % of the penetration depth, keep the core.
    - If insufficient amount of material is recovered, discard the core into a re-sealable 5-gallon pail and store for subsequent disposal by the field processing team. Rinse the core tube with river water and prepare to make an additional attempt.
      - An additional attempt will be made at a minimum distance of 2 ft from the previously attempted location.
      - A maximum of three attempts to collect a core will be made for a given location ID.
      - Rinse the core tubes with the river water between consecutive attempts.
      - If all three attempts to collect a core are unsuccessful based on recovery alone (i.e., less than 60% recovery), retain the final core for analysis and indicate that the targeted recovery was not achieved.

12. After successful core recovery enter additional information into the field notes.

    - Date;
    - Time of recovery;
    - Sample position;
    - Water depth (ft);
    - Core tube material (aluminum or Lexan®);
    - Core penetration depth (in); and
    - Observation, including probing results.

13. Remove the core tube from the vibracore device and place a second cap on the top of the core tube. Secure the cap in place with duct tape. Rinse the outside of the core tube with a small amount of river water.

14. Draw an arrow on the core tube with permanent marker to mark the top of the core. Label the core with permanent marker indicating station ID, date, and time.

15. Store the core vertically while on the vessel and transport to the processing area.

## *IV. References*

Blasland, Bouck & Lee, Inc. (BBL). Health and Safety Plan for Field Activities at the Grasse River Site. April 2003.

**Grasse River Study Area**

**Supplemental Sediment Sampling Upstream of Transect T20**

## Introduction

This plan presents sediment sampling activities that aim to obtain the information needed to better understand the spatial and vertical extent of polychlorinated biphenyls (PCBs) in fine (i.e., Type II) sediment areas located upstream of transect T20. The sampling locations and protocols, as well as prioritization for sample collection are provided below. Quality assurance/quality control (QA/QC) measures for this program are also discussed.

## Sediment Sampling Locations

A total of 20 locations in fine sediment areas are targeted for sample collection: 11 locations between transects T5 and T10 and 9 locations between transects T17 and T20. The proposed sampling locations for each of the areas are identified below and presented in Figure 1.

Transects T5 to T10

- T5: mid-channel
- T6: 1/3 and 2/3 points across river channel
- T6.5: 1/3 and 2/3 points across river channel
- T7: northern third of channel (1/4 point across river)
- T7.5: 1/3 and 2/3 points across river channel
- T8: 1/3 and 2/3 points across river channel
- T9: northern third of channel (1/4 point across river)

Transects T17 to T20

- T17.5: 1/3 and 2/3 points across river channel
- T18: 1/4 and 3/4 points across river channel
- T18.5: 1/3 and 2/3 points across river channel
- T19: 1/3 and 2/3 points across river channel
- T19.5: mid-channel

## Sampling Protocol

Each sediment sampling location will be identified and recorded using differential global positioning system (DGPS) surveying techniques. Due to the presence of an ice cover on the lower Grasse River, holes will be drilled (using an auger device) through the ice and sediment cores will be obtained using the manual coring techniques described in the *2003 Monitoring Work Plan* (Alcoa, April 2003). In the event that a core cannot be obtained at a particular location due to a lack of sediments, the target location will be identified as a "no recovery" location and abandoned - no attempts will be made to obtain sediment cores through the ice from nearby locations.

Upon retrieval, sediment cores will be opened, split, photographed and visually observed. Each core will be segmented into the following intervals: 0 to 3 inches, 3 to 12 inches, 12 to 18 inches and every 6 inches thereafter to the bottom of the core. This segmentation scheme was selected to: (1) provide surface sediment PCB data that are comparable to those measured during historic surveys; and (2) better define the vertical distribution of PCBs within the targeted sediment deposits. The physical characteristics (i.e., general soil type and approximate grain size) of each sample will be recorded. All samples will be packaged and submitted for PCB (Aroclor), total organic carbon (TOC), bulk density, moisture content, and grain size analyses.

**Prioritization of Sampling Locations**

The successful collection of sediment cores during the winter season will be dependent on weather conditions and ice thickness in Massena. For this reason, sediment cores should be collected as directed in the following order:

Transects T5 to T10

- T7: northern third of channel (1/4 point across river)
- T6.5: 1/3 and 2/3 points across river channel
- T7.5: 1/3 and 2/3 points across river channel
- T6: 1/3 and 2/3 points across river channel
- T5: mid-channel
- T8: 1/3 and 2/3 points across river channel
- T9: northern third of channel (1/4 point across river)

Transects T17 to T20

- T17.5: 1/3 and 2/3 points across river channel
- T18.5: 1/3 and 2/3 points across river channel
- T19.5: mid-channel
- T18: 1/4 and 3/4 points across river channel
- T19: 1/3 and 2/3 points across river channel

**QA/QC Measures**

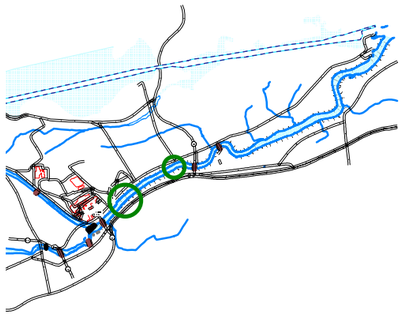
QA/QC samples will include one blind duplicate sample and one matrix spike/matrix spike duplicate (MS/MSD) sample per 20 sediment samples collected. The blind duplicate samples will be analyzed for PCB (Aroclor), TOC, bulk density, moisture content, and grain size analyses. The MS/MSD samples will be analyzed for PCB (Aroclor).

If sampling is performed using non-disposable equipment, rinse blank samples will be collected before and after sampling and submitted for PCB (Aroclor).

**References**

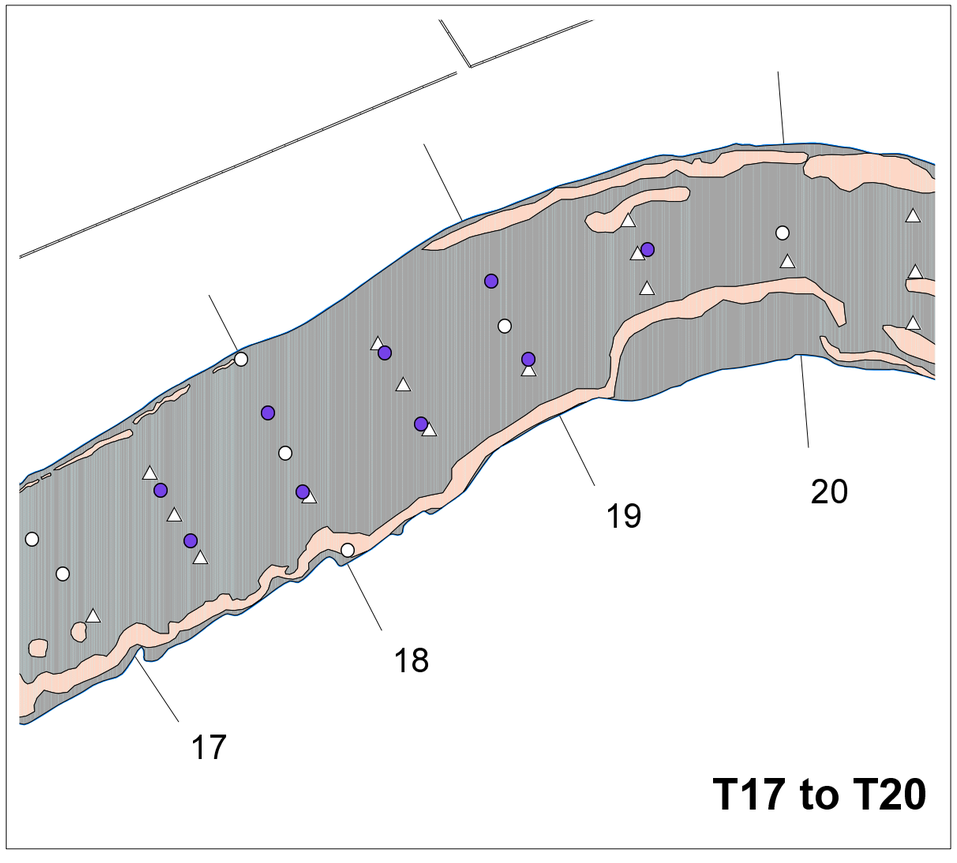
Alcoa Inc. *2003 Monitoring Work Plan.* April 2003.

Locator Map






T5 to T10




T17 to T20

N

GRAPHIC SCALE

100 0 100 Feet

LEGEND

- Sediment Core Locations

Samples Collected in 2003

- core
- grab
- No Recovery

Sediment Type

- Type 1
- Type 2
- Roads
- Grasse River + Tributaries Shoreline
- Sediment Probing Transects

**Lower Grasse River Study Area**
**Massena, New York**

Figure 1.
Supplemental Sediment Sampling
Upstream of Transect T20

ALCOA

Jan 2004

\\ECd\ALCgra\Documents\reports\CPS_PCB_sampling_plan\Jan_2004\GIS\sampT5T10_T17T20_2004_040109.apr

# Environmental Database

*Capping Pilot Study*

This appendix contains the Environmental Database for the Capping Pilot Study (CPS). This database is provided electronically on the enclosed CD. A data dictionary is also included to facilitate use of the database.

**Data Dictionary for CPS Environmental Database**

**Grasse River Study Area**
**Massena, New York**

**Table 1**
**Data Dictionary for cap_adcp_velocity**

***Data Table Description:*** Water velocity data collected using Acoustic Doppler Current Profilers (ADCPs). 2001 data collected during Capping Pilot Study between August 10 and September 10. 2002 data collected during Capping Pilot Monitoring Program between May 2 and June 4.

***Data Table Name:*** cap_adcp_velocity

| ***Field Name*** | ***Description*** |
|---|---|
| Station | Station number. For 2001 data, station location is along sediment probing transect T19 from North shore: 1 = ¾ of river width, 2 = ½ of river width, and 3 = ¼ of river width. For 2002 data, station location is at mid-channel of sediment probing transect: 1 = T57, 2 = T36, 3 = T26, and 4 = T16. |
| Northing | Estimated 1983 NY State Plane Northing |
| Easting | Estimated 1983 NY State Plane Easting |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Hour | Sample hour |
| Minute | Sample minute |
| Second | Sample second |
| Va_mag | Vertically-averaged water velocity magnitude (millimeters per second) |
| Va_dir | Vertically-averaged water velocity direction (degrees) |
| Mag1 | Water velocity magnitude at bin 1 closest to the riverbed (millimeters per second) |
| Dir1 | Water velocity direction at bin 1 closest to the riverbed (degrees) |

*(continued)*

**Table 1**
**Data Dictionary for cap_adcp_velocity**
**(continued)**

| ***Field Name*** | ***Description*** |
|---|---|
| Mag2 | Water velocity magnitude at bin 2 (millimeters per second) |
| Dir2 | Water velocity direction at bin 2 (degrees) |
| Mag3 | Water velocity magnitude at bin 3 (millimeters per second) |
| Dir3 | Water velocity direction at bin 3 (degrees) |
| Mag4 | Water velocity magnitude at bin 4 (millimeters per second) |
| Dir4 | Water velocity direction at bin 4 (degrees) |
| Mag5 | Water velocity magnitude at bin 5 (millimeters per second) |
| Dir5 | Water velocity direction at bin 5 (degrees) |
| Mag6 | Water velocity magnitude at bin 6 (millimeters per second) |
| Dir6 | Water velocity direction at bin 6 (degrees) |
| Mag7 | Water velocity magnitude at bin 7 (millimeters per second) |
| Dir7 | Water velocity direction at bin 7 (degrees) |
| Mag8 | Water velocity magnitude at bin 8 (millimeters per second) |
| Dir8 | Water velocity direction at bin 8 (degrees) |
| Mag9 | Water velocity magnitude at bin 9 (millimeters per second) |
| Dir9 | Water velocity direction at bin 9 (degrees) |
| Mag10 | Water velocity magnitude at bin 10 (millimeters per second) |
| Dir10 | Water velocity direction at bin 10 (degrees) |
| Mag11 | Water velocity magnitude at bin 11 (millimeters per second) |
| Dir11 | Water velocity direction at bin 11 (degrees) |

*(continued)*

**Table 1**
**Data Dictionary for cap_adcp_velocity**
**(continued)**

| ***Field Name*** | ***Description*** |
|---|---|
| Mag12 | Water velocity magnitude at bin 12 (millimeters per second) |
| Dir12 | Water velocity direction at bin 12 (degrees) |

***Notes:***

1. -999 indicates parameter not measured.
2. See table below for distance (in meters) of ADCP sensor from riverbed for a given bin number:

| **Year** | **2001** | **2002** | | | |
|---|---|---|---|---|---|
| **Bin/Station** | **1, 2, or 3** | **1** | **2** | **3** | **4** |
| 1 | 0.5 | 1.0 | 1.0 | 1.0 | 1.5 |
| 2 | 1.0 | 1.5 | 1.5 | 1.5 | 2.0 |
| 3 | 1.5 | 2.0 | 2.0 | 2.0 | 2.5 |
| 4 | 2.0 | 2.5 | 2.5 | 2.5 | 3.0 |
| 5 | 2.5 | 3.0 | 3.0 | 3.0 | --- |
| 6 | 3.0 | 3.5 | 3.5 | 3.5 | --- |
| 7 | --- | --- | 4.0 | 4.0 | --- |
| 8 | --- | --- | 4.5 | 4.5 | --- |
| 9 | --- | --- | 5.0 | --- | --- |
| 10 | --- | --- | 5.5 | --- | --- |
| 11 | --- | --- | 6.0 | --- | --- |
| 12 | --- | --- | 6.5 | --- | --- |

**Grasse River Study Area**
**Massena, New York**

**Table 2**
**Data Dictionary for cap_benthic_comm**

***Data Table Description:*** Benthic community data from capping pilot study.

***Data Table Name:*** cap_benthic_comm

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey period (Pre-capping, Post-capping) |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Cell | Cell where sample was collected (#1D = subcell; #2, 3, 4 = pilot cells; #5 = optional pilot cell sampled during Pre-capping; reference = upstream near sediment probing Transect T8) |
| Location | Location where sample was collected (LBC = local benthic community sample location, UBC = upstream benthic community sampling location) |
| Northing | 1983 NY State Plane northing (feet) |
| Easting | 1983 NY State Plane easting (feet) |
| Wc_dep | Total depth of water column (feet) |
| Temp | Temperature (degrees Celsius) |
| Cond | Specific conductivity (milliSiemens/centimeter) |
| pH | pH (standard units) |
| Turb | Turbidity (nephelometric turbidity units) |
| DO | Dissolved oxygen (milligrams/liter) |
| Gravel_coarse | Particles with diameters between 19.1 and 76.2 millimeters (% by mass) |

*(continued)*

**Table 2**
**Data Dictionary for cap_benthic_comm**
**(continued)**

| ***Field Name*** | ***Description*** |
|---|---|
| Gravel_fine | Particles with diameters between 4.8 and 19.1 millimeters (% by mass) |
| Sand_coarse | Particles with diameters between 2.0 and 4.8 millimeters (% by mass) |
| Sand_medium | Particles with diameters between 0.42 and 2.0 millimeters (% by mass) |
| Sand_fine | Particles with diameters between 0.07 and 0.42 millimeters (% by mass) |
| Silt | Particles with diameters between 0.005 and 0.07 millimeters (% by mass) |
| Clay | Particles with diameters between 0.001 and 0.005 millimeters (% by mass) |
| TOC | Total organic carbon (milligrams/ kilogram dry weight) |
| Placobdella montifera *through* Unid. Nematoda | Number of taxa identified |
| Tot_indiv | Total number of individuals identified |
| Tot_taxa | Total number of taxa identified |
| Tot_biomass | Wet-weight of benthic organisms (milligrams) |

***Notes:***
1. -999 indicates parameter not measured.
2. Sample collection depths for water quality data:
   June 2001: 0.8 times total water column depth
   Oct 2001: within one meter of river bottom
   Apr 2002: within three feet of river bottom
   Oct 2002: within three feet of river bottom

*(continued)*

**Table 2**
**Data Dictionary for cap_benthic_comm**
**(continued)**

| Phylum | Class/Subclass | Order | Family | Genus | Species |
|---|---|---|---|---|---|
| Annelida | Hirudinea | Rhynchobdellida | Glossiphoniidae | Placobdella | Montifera |
| Annelida | Oligochaeta | Haplotaxida | Naididae | --- | --- |
| Annelida | Oligochaeta | Haplotaxida | Naididae | Stylaria | Unid. |
| Annelida | Oligochaeta | Haplotaxida | Tubificidae | --- | Unid. Immature |
| Annelida | Oligochaeta | Haplotaxida | Tubificidae | Aulodrilus | Unid. |
| Annelida | Oligochaeta | Haplotaxida | Tubificidae | Ilyodrilus | Unid. |
| Annelida | Oligochaeta | Haplotaxida | Tubificidae | Limnodrilus | Unid. |
| Annelida | Oligochaeta | Haplotaxida | Tubificidae | Quistadrilus/Spirosperma | --- |
| Annelida | Oligochaeta | Lumbriculida | Lumbriculidae | --- | --- |
| Annelida | Polychaeta | --- | Aeolosomatidae | --- | --- |
| Annelida | Polychaeta | --- | Aeolosomatidae | Aeolosoma | Unid. |
| Annelida | Polychaeta | Canalipalpata | Sabellidae | Manayunkia | Speciosa |
| Arthropoda | Crustacea | Amphipoda | Gammaridae | Gammarus | Unid. |
| Arthropoda | Crustacea | Isopoda | Asellidae | Caecidotea | Unid. |
| Arthropoda | Insecta | Coleoptera | Elmidae | Dubiraphia | Unid. |
| Arthropoda | Insecta | Coleoptera | Elmidae | Macronychus | Glabratus |
| Arthropoda | Insecta | Coleoptera | Elmidae | Optioservus | Unid. |
| Arthropoda | Insecta | Coleoptera | Elmidae | Promoresia | Unid. |
| Arthropoda | Insecta | Coleoptera | Elmidae | Stenelmis | Unid. |
| Arthropoda | Insecta | Coleoptera | Gyrinidae | Dineutus | Unid. |
| Arthropoda | Insecta | Coleoptera | Hydrophiloidea | Berosus | Unid. |
| Arthropoda | Insecta | Diptera | Ceratopogoninae* | --- | --- |
| Arthropoda | Insecta | Diptera | Chaoboridae | Chaoborus | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Ablabesmyia | Annulata |
| Arthropoda | Insecta | Diptera | Chironomidae | Ablabesmyia | Sp. 1 |
| Arthropoda | Insecta | Diptera | Chironomidae | Ablabesmyia | Sp. 2 |
| Arthropoda | Insecta | Diptera | Chironomidae | Ablabesmyia | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Chironomini** | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Chironomus | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Cladotanytarsus | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Clinotanypus | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Coelotanypus | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Cricotopus | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Cryptochironomus | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Dicrotendipes | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Epoicocladius | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Microtendipes | Unid. |

*(continued)*

**Table 2**
**Data Dictionary for cap_benthic_comm**
**(continued)**

| Phylum | Class/Subclass | Order | Family | Genus | Species |
|---|---|---|---|---|---|
| Arthropoda | Insecta | Diptera | Chironomidae | Monodiamesa | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Nilothauma | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Pagastiella | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Paracladopelma | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Paralauterborniella | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Paratendipes | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Phaenopsectra | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Genus nr. Phaenopsectra | --- |
| Arthropoda | Insecta | Diptera | Chironomidae | Polypedilum | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Procladius | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Stictochironomus | Unid. |
| Arthropoda | Insecta | Diptera | Chironomidae | Tanytarsus | Unid |
| Arthropoda | Insecta | Diptera | Chironomidae | Genus nr. Zavrelia | --- |
| Arthropoda | Insecta | Diptera | Orthocladiinae* | --- | Unid. |
| Arthropoda | Insecta | Ephemeroptera | Caenidae | Caenis | Amica |
| Arthropoda | Insecta | Ephemeroptera | Caenidae | Caenis | Latipennis |
| Arthropoda | Insecta | Ephemeroptera | Caenidae | Caenis | Unid. |
| Arthropoda | Insecta | Ephemeroptera | Ephemeridae | Hexagenia | Unid. |
| Arthropoda | Insecta | Ephemeroptera | Heptageniidae | Stenonema | Unid. |
| Arthropoda | Insecta | Ephemeroptera | Isonychiidae | Isonychia | Unid. |
| Arthropoda | Insecta | Ephemeroptera | Leptophlebiidae | --- | --- |
| Arthropoda | Insecta | Megaloptera | Sialidae | Sialis | Unid. |
| Arthropoda | Insecta | Odonata | Coenagrionidae | Coenagrion/Enallagma | --- |
| Arthropoda | Insecta | Trichoptera | Brachycentridae | Micrasema | Unid. |
| Arthropoda | Insecta | Trichoptera | Dipseudopsidae | Phylocentropus | Unid. |
| Arthropoda | Insecta | Trichoptera | Leptoceridae | Oecetis | Unid. |
| Arthropoda | Insecta | Trichoptera | Polycentropodidae | Polycentropus | Unid. |
| Mollusca | Bivalvia | Unionoida | Unionidae | Pyganodon | Unid. |
| Mollusca | Bivalvia | Veneroida | Pisidiidae | Pisidium | Unid. |
| Mollusca | Bivalvia | Veneroida | Pisidiidae | Sphaerium | Unid. |
| Mollusca | Gastropoda | Basommatophora | Physidae | Physa/Physella | Unid. |
| Mollusca | Gastropoda | Neotaenioglossa | Hydrobiidae | --- | --- |
| Nematoda | --- | --- | --- | --- | Unid. |

* subfamily
** tribe

4. The order Oligochaeta was combined with the order Polychaeta in the laboratory data sheets in the April 2002 study.

**Grasse River Study Area**
**Massena, New York**

**Table 3**
**Data Dictionary for cap_capmat**

***Data Table Description:*** Grain size and TOC data from capping pilot study for capping material before placement.

***Data Table Name:*** cap_capmat

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey period (Pre-capping, During-capping) |
| Lab | Laboratory where sample was analyzed (CDM/NEA = Camp, Dresser & McKee, Inc. for grain size and Northeast Analytical, Inc. for TOC) |
| Lab_ID | Lab identification code used by NEA |
| Sample_ID | Sample identification code |
| Dupe | Indication of sample duplicate (DUP = yes, blank = no) |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Hour | Sample hour |
| Material | Type of sample material (Topsoil or 1:1 Mixture = sand and topsoil mix) |
| TOC | Total organic carbon (milligrams/kilogram dry weight) |
| Per_solids | Percent solids (%) |
| Per_pass_4pt75_mm | Percent of sample passing 4.75 mm sieve (%) |
| Per_pass_0pt425_mm | Percent of sample passing 0.425 mm sieve (%) |
| Per_pass_0pt075_mm | Percent of sample passing 0.075 mm sieve (%) |
| Per_pass_00pt005_mm | Percent of sample passing 0.005 mm sieve (%) |

*(continued)*

**Table 3**
**Data Dictionary for cap_capmat**
**(continued)**

***Notes:***

1. -999 indicates parameter not measured.
2. Negative numbers (other than -999) indicate the concentration was below the detection limit (DL), i.e. -1660 means the concentration was less than the DL of 1660 milligrams per kilogram dry-weight.

**Grasse River Study Area**
**Massena, New York**

**Table 4**
**Data Dictionary for cap_cont_turbidity**

***Data Table Description:*** Continuous turbidity measurements collected inside cell during capping pilot study.

***Data Table Name:*** cap_cont_turbidity

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey period (Pre-capping, During-capping, Post-capping) |
| Cell | Cell where measurement was made (#1A, 1B1, 1B2, 1C2, 1D = subcells; #2, 3, 4 = pilot cells) |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Time | Sample time (hours:minutes:seconds) |
| Turb | Turbidity (nephelometric turbidity units) |

**Grasse River Study Area**
**Massena, New York**

**Table 5**
**Data Dictionary for cap_gw_seepage**

***Data Table Description:*** Groundwater seepage rates from capping pilot study.

***Data Table Name:*** cap_gw_seepage

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey period (Post-capping) |
| Year | Sample year |
| Month_depl | Month sample was deployed |
| Day_depl | Day sample was deployed |
| Month_retr | Month sample was retrieved |
| Day_retr | Day sample was retrieved |
| Duration | Number of days water collection bags remained in river |
| Round | Sampling round number (some collection bags left in river for two rounds) |
| Location | Groundwater meter identification |
| Cell | Cell location (US-* = upstream of capped area, DS-* = downstream of capped area; #2, 3, 4 = pilot cells; #1D = subcell) |
| Meter | Identification of individual meters for groundwater pairs |
| Northing | Estimated 1983 NY State Plane northing |
| Easting | Estimated 1983 NY State Plane easting |
| Gw_flux | Groundwater flux ($L/m^2$-d) |
| Gas | Presence of gas in collection bag (Y = yes) |
| Sig_gas_press | Presence of significant gas pressure in collection bag (Y = yes) |

***Notes:***
1. -999 indicates parameter not measured.

**Grasse River Study Area**
**Massena, New York**

**Table 6**
**Data Dictionary for cap_pg_elev**

***Data Table Description:*** Water surface elevation data collected during Capping Pilot Study using pressure gauge (8/10/01 – 9/10/01).

***Data Table Name:*** cap_pg_elev

| ***Field Name*** | ***Description*** |
|---|---|
| Station | Station number (along sediment probing transect T19 from North shore: 1 = ¾ of river width, 2 = ½ of river width) |
| Northing | Estimated 1983 NY State Plane Northing |
| Easting | Estimated 1983 NY State Plane Easting |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Hour | Sample hour |
| Minute | Sample minute |
| Second | Sample second |
| Elevation | Water surface elevation (feet) |

***Notes:***
1. -999 indicates parameter not measured.
2. Water surface elevation referenced to the project International Great Lakes datum (IGLD 1,935 feet) via the Alcoa benchmark located on the sheet pile wall of the effluent discharge facility.

**Grasse River Study Area**
**Massena, New York**

**Table 7**
**Data Dictionary for cap_riverflow_tapedown**

***Data Table Description:*** Paired tapedown measurements from Main Street Bridge and measured flows (Transect WC001) during capping pilot study.

***Data Table Name:*** cap_riverflow_tapeflow

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey period (Pre-capping, During-capping, Post-capping) |
| Location | Location identifier (WC001 = water column transect WC001) |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Hour | Sample hour |
| Northing | Estimated 1983 NY State Plane northing |
| Easting | Estimated 1983 NY State Plane easting |
| Tape_dep | Tapedown measurement from Main St. Bridge (feet) |
| Meas_flow | Measured flow at water column Transect WC001 (cubic feet/second) |

***Notes:***
1. -999 indicates parameter not measured.

**Grasse River Study Area**
**Massena, New York**

**Table 8**
**Data Dictionary for cap_sed_shaker**

***Data Table Description:*** TSS measurements from Pilot Cells and Test Cell Subcell #1D during shaker study.

***Data Table Name:*** cap_sed_shaker

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey period (Post-capping) |
| Lab | Laboratory where sample was analyzed (NEA = Northeast Analytical, Inc.) |
| Lab_id | Laboratory identification number |
| Sample_id | Sample identification code |
| Dupe | Indication of sample duplicate (DUP = yes, blank = no) |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Hour | Sample hour |
| Cell | Cell in which sample was collected (1D = subcell; 2, 3, 4 = pilot cells) |
| Core | Core name |
| Tau | Shear stress (dynes/$cm^2$) |
| Water_dep | Water depth (feet) |
| TSS | Total suspended solids (mg/L) |
| Location | Sample location |

***Notes:***

1. Shaker study conducted with 3" of water above cores.
   Negative numbers (other than –999) indicate the concentration was below the detection limit (DL), i.e. –7.52 means the concentration was less than the DL of 7.52 milligrams per liter.

**Grasse River Study Area**
**Massena, New York**

**Table 9**
**Data Dictionary for cap_sediment_aro**

***Data Table Description:*** Sediment data (Aroclor) from capping pilot study.

***Data Table Name:*** cap_sediment_aro

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey period (Pre-capping, During-capping, Post-capping, Phase II) |
| Lab | Laboratory where sample was analyzed (NEA = Northeast Analytical, Inc.) |
| Lab_id | Laboratory identification number |
| Sample_id | Sample identification code |
| Dupe | Indication of sample duplicate (DUP = yes, blank = no) |
| Type | Sample type (grab, core, or QA/QC = quality assurance/quality control) |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Cell_trans | Cell number (#1A, 1B1, 1B2, 1C2, 1D = subcells; #2, 3, 4 = pilot cells) or sediment probing transect number (T<#>) |
| Northing | 1983 NY State Plane northing (feet) |
| Easting | 1983 NY State Plane easting (feet) |
| Start_dep | Starting depth of sample |
| End_dep | Ending depth of sample |
| Dep_units | Units of depth of measured sample |
| A_1016 *through* A_1260 | Aroclor_# concentration, where # = 1016, 1221, 1232, 1242, 1248, 1254, 1260 (milligrams/kilogram dry weight) |

*(continued)*

**Table 9**
**Data Dictionary for cap_sediment_aro**
**(continued)**

| ***Field Name*** | ***Description*** |
|---|---|
| Tot_PCB_aro | Aroclor total PCB concentration (milligrams/kilogram dry weight) |
| TOC | Total organic carbon (milligram/kilogram dry weight) |
| Per_solids | Percent solids (%) |
| B_dens | Bulk density (grams/milliliter) |
| Per_moist | Percent moisture (%) |
| Per_rec | Percent recovery (%) |

***Notes:***

1. -999 indicates parameter not measured.
2. Negative numbers (other than –999) indicate the concentration was below the detection limit (DL), i.e. –0.232 means the concentration was less than the DL of 0.232 milligrams per kilogram dry-weight.
3. If no data are listed for a sample (i.e., all entries are -999), no sample was collected at that location due to lack of sediment.

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**Massena, New York**

**Table 10**
**Data Dictionary for cap_sediment_bz**

***Data Table Description:*** Sediment data (BZ) from capping pilot study.

***Data Table Name:*** cap_sediment_bz

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey period (Pre-capping) |
| Lab | Laboratory where sample was analyzed (NEA = Northeast Analytical, Inc.) |
| Lab_id | Laboratory identification number |
| Sample_id | Sample identification code |
| Type | Sample type (QA/QC = quality assurance/quality control, core, grab) |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Rmile | River mile estimated from confluence of Grasse and St. Lawrence Rivers |
| Northing | 1983 NY State Plane northing (feet) |
| Easting | 1983 NY State Plane easting (feet) |
| Start_dep | Starting depth of sample |
| End_dep | Ending depth of sample |
| Dep_units | Units of depth of sample |
| TOC | Total organic carbon (milligrams/kilogram dry weight) |
| B_dens | Bulk density (grams/milliliter) |

*(continued)*

**Table 10**
**Data Dictionary for cap_sediment_bz**
**(continued)**

| ***Field Name*** | ***Description*** |
|---|---|
| Per_moist | Percent moisture (%) |
| Per_solids | Percent solids (%) |
| BZ_1 *through* BZ_209 | BZ_# concentration, where # = numbers 1 through 209 (milligrams/kilogram dry weight) |
| Tot_PCB_bz | BZ total PCB concentration (milligrams/kilogram dry weight) |
| Mono *through* Nona | #chlorinated biphenyl, where # = mono, di, tri, tetra, penta, hexa, hepta, octa, nona (weight percent) |
| Meta | Meta-chlorines per biphenyl |
| Para | Para-chlorines per biphenyl |
| Clbp | Chlorines per biphenyl |
| Per_rec | Percent recovery (%) |

***Notes:***
1. -999 indicates parameter not measured.

**Grasse River Study Area**
**Massena, New York**

**Table 11**
**Data Dictionary for cap_sediment_cap_thickness**

***Data Table Description:*** Cap thickness measurements in test and pilot cells during and after capping pilot study.

***Data Table Name:*** cap_sediment_cap_thickness

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey period (DURING = During-capping, POST1 = Post-capping Sept and Oct 2001, POST2 = Post-capping April 2002) |
| Month | Sample month |
| Year | Sample year |
| Method | Method used to measure cap thickness (core = observation of collected sediment cores, grid node = GPS surveying) |
| Cell | Cell in which sample was collected ( #1A, 1B1, 1B2, 1C2, 1D = subcells, #2, 3, 4 = pilot cells, wedge = centerline area between test and pilot cells) |
| Location_ID | Location identification code |
| Northing | 1983 NY State Plane northing (feet) |
| Easting | 1983 NY State Plane easting (feet) |
| Cap_thick | Cap thickness measured within each subcell (feet) |
| Comments | Comments reported by field crew during measurement of cap_thick_during |

***Notes:***
1. –999 indicates parameter not measured.

**Grasse River Study Area**
**Massena, New York**

**Table 12**
**Data Dictionary for cap_sediment_grainsize**

***Data Table Description:*** Grain size data for sediment samples from capping pilot study.

***Data Table Name:*** cap_sediment_grainsize

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey period (During-capping, Post-capping) |
| Lab | Laboratory where sample was analyzed (CDM = Camp, Dresser & McKee, Inc.) |
| Sample_ID | Sample identification code |
| Dupe | Indication of sample duplicate (DUP = yes, blank = no) |
| Type | Sample type (core) |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Cell | Cell number (#1A, 1B1, 1B2, 1C2, 1D = subcells; #2, 3, 4 = pilot cells) |
| Northing | 1983 NY State Plane northing (feet) |
| Easting | 1983 NY State Plane easting (feet) |
| Start_dep | Starting depth of sample |
| End_dep | Ending depth of sample |
| Dep_units | Units of depth of sample |
| Per_pass_4pt75_mm | Percent of sample passing 4.75 mm sieve (%) |
| Per_pass_0pt425_mm | Percent of sample passing 0.425 mm sieve (%) |

*(continued)*

**Table 12**
**Data Dictionary for cap_sediment_grainsize**
**(continued)**

| ***Field Name*** | ***Description*** |
|---|---|
| Per_pass_0pt075_mm | Percent of sample passing 0.075 mm sieve (%) |
| Per_pass_0pt005_mm | Percent of sample passing 0.005 mm sieve (%) |
| Notes | Notes reported by laboratory |

***Notes:***
1. -999 indicates parameter not measured.

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**Massena, New York**

**Table 13**
**Data Dictionary for cap_sediment_gridnode_QAQC**

***Data Table Description:*** Sediment elevations measured in Test Cell Subcells prior to capping pilot study.

***Data Table Name:*** cap_sediment_gridnode_QAQC

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey period (Pre-capping) |
| Month | Sample month |
| Day | Sample day |
| Year | Sample year |
| Test_Cell_Subcell | Test Cell Subcell in which measurement was made ( #1A, 1B1, 1B2, 1C2, 1D) |
| Location_ID | Location identification code |
| Sed_elev | Top of sediment elevation measured within each subcell (feet) |

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**Massena, New York**

**Table 14**
**Data Dictionary for cap_sedprobe_T15-T17**

***Data Table Description:*** Sediment probing data collected between sediment probing Transects T15 and T17 for capping pilot study.

***Data Table Name:*** cap_sedprobe_T15-T17

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey period (Pre-capping) |
| Sample_id | Sample identification code |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Location | Sample location |
| Shore_dist | Distance of sample from north shore (feet) |
| Northing | 1983 NY State Plane northing (feet) |
| Easting | 1983 NY State Plane easting (feet) |
| Elevation | Measurement from top of sediment (feet above sea level) |
| Water_dep | Depth of water at sediment probing location (feet) |
| Sed_thick | Thickness of sediment at sediment probing location (feet) |
| Sed_dep | Depth of sediment from the water surface (feet) |
| Sed_type | Description of soil type at sediment probing location |

*Notes:*
1. -999 indicates parameter was not measured
2. Sample endings for the "sample_id" indicate the following:
   - **"A" –** survey pin location at northern shore
   - **"B"** – survey pin location at southern shore
   - **"EW" –** edge of water
   - **"TB" –** top of bank
   - **"BB" –** bottom of bank

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**Massena, New York**

**Table 15**
**Data Dictionary for cap_spmd_bz**

***Data Table Description:*** SPMD samples (BZ) from capping pilot study.

***Data Table Name:*** cap_spmd_bz

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey period (Pre-capping, During-capping, Post-capping) |
| Lab | Laboratory where sample was analyzed (NEA = Northeast Analytical, Inc.) |
| Lab_id | Laboratory identification number |
| Sample_id | Sample identification code |
| Dupe | Indication of sample duplicate (DUP = yes, blank = no) |
| Transect | Transect (US(T14) = upstream at sediment probing Transect T14, DS(T18) = downstream at sediment probing Transect T18) |
| Set | Sampling set (PRE = pre-capping; #1A, 1B1, 1B2, 1C2, 1D = monitoring of subcells; #2, 3, 4 = monitoring of pilot cells; POST = post-capping) |
| Rmile | River mile estimated from confluence of Grasse and St. Lawrence Rivers |
| Wc_dep | Water column depth (feet) |
| Sample_dep | Sample depth (feet) |
| Year | Sample year |
| Month_depl | Month sample was deployed |
| Day_depl | Day sample was deployed |
| Month_retr | Month sample was retrieved |
| Day_retr | Day sample was retrieved |
| Duration | Number of days SPMDs remained in river |

*(continued)*

**Table 15**
**Data Dictionary for cap_spmd_bz**
**(continued)**

| ***Field Name*** | ***Description*** |
|---|---|
| BZ_1 *through* BZ_209 | BZ_# mass, where # = numbers 1 through 209 (nanograms/SPMD) |
| Tot_PCB_bz | BZ total PCB mass (nanograms/SPMD) |
| Mono *through* Deca | #chlorinated biphenyl, where # = mono, di, tri, tetra, penta, hexa, hepta, octa, nona, deca (weight percent) |
| Ortho | Ortho-chlorines per biphenyl |
| Meta | Meta-chlorines per biphenyl |
| Para | Para-chlorines per biphenyl |
| Clbp | Chlorines per biphenyl |
| Surr_spk | Surrogate spike (nanograms) |
| Surr_rec | Surrogate recovered (nanograms) |
| Surr_per | Percent surrogate recovered (%) |

***Notes:***
1. -999 indicates parameter not measured.

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**Massena, New York**

**Table 16**
**Data Dictionary for cap_turbidity_echo**

***Data Table Description:*** Acoustic turbidity data computed from ADCP echo intensity data of sensor closest to the riverbed (5/2/02 – 6/4/02).

***Data Table Name:*** cap_turbidity_echo

| ***Field Name*** | ***Description*** |
|---|---|
| Station | Station number (at mid-channel of sediment probing transect: 1 = T57, 2 = T36, 3 = T26, and 4 = T16) |
| Northing | Estimated 1983 NY State Plane Northing |
| Easting | Estimated 1983 NY State Plane Easting |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Hour | Sample hour |
| Minute | Sample minute |
| Turb_NTU | Turbidity measured 1.0 meters from the riverbed (except station 4 measured 1.5 meters from the riverbed) (NTU) |

***Notes:***
1. -999 indicates parameter not measured.

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**Massena, New York**

**Table 17**
**Data Dictionary for cap_turbidity_obs**

***Data Table Description:*** Optical backscatter turbidity data measured at 1.5 and 3.0 feet above the riverbed (5/2/02 – 6/4/02).

***Data Table Name:*** cap_turbidity_obs

| ***Field Name*** | ***Description*** |
|---|---|
| Station | Station number (at mid-channel of sediment probing transect: 1 = T57, 2 = T36, 3 = T26, and 4 = T16) |
| Northing | Estimated 1983 NY State Plane Northing |
| Easting | Estimated 1983 NY State Plane Easting |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Hour | Sample hour |
| Minute | Sample minute |
| NTU_3 | Turbidity measured at 3.0 feet from the riverbed (NTU) |
| NTU_05 | Turbidity measured at 0.5 feet from the riverbed (NTU) |

***Notes:***
1. -999 indicates parameter not measured.

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**Massena, New York**

**Table 18**
**Data Dictionary for cap_water_aro**

***Data Table Description:*** Water column samples (Aroclor) from capping pilot study.

***Data Table Name:*** cap_water_aro

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey period (Pre-capping, During-capping, Post-capping) |
| Lab | Laboratory where sample was analyzed (Alcoa = Alcoa-Massena Chem Lab, NEA = Northeast Analytical, Inc., STL = Severn Trent Lab) |
| Lab_id | Laboratory identification code |
| Sample_id | Sample identification code |
| Dupe | Indication of sample duplicate (Sample_id = duplicate; blank = no) |
| Type | Sample type (QAQC = quality assurance/quality control, TOTAL = total, unfiltered, DISS = dissolved) |
| Description | Sample description (COMP = composite, DISC = Discrete, QAQC = quality assurance/quality control) |
| Cell | Cell being capped (#1A, 1B1, 1B2, 1C2, 1D = subcells; #2, 3, 4 = pilot cells) |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Hour | Sample hour |
| Location | Sample location (see comment (2) under Table B-13) |
| TSS | Total suspended solids (milligrams/liter) |
| A_1016 *through* A_1260 | Aroclor_# concentration, where # = 1016, 1221, 1232, 1242, 1248, 1254, 1260 (nanograms/liter) |
| Tot_PCB_aro | Aroclor total PCB concentration (nanograms/liter) |

*(continued)*

**Table 18**
**Data Dictionary for cap_water_aro**
**(continued)**

| ***Field Name*** | ***Description*** |
|---|---|
| Per_rec | Percent recovery (%) |
| Surr_per_tetrachlor_m_xylene | Percent surrogate recovery of tetrachloro-m-xylene (%) |
| Surr_per_decachlorobiphenyl | Percent surrogate recovery of decachlorobiphenyl (%) |

***Notes:***

1. -999 indicates parameter not measured.
2. Negative numbers (other than -999) indicate the concentration was below the detection limit (DL), i.e. -50 means the concentration was less than the DL of 50 nanograms per liter.

**Grasse River Study Area**
**Massena, New York**

**Table 19**
**Data Dictionary for cap_water_field**

***Data Table Description:*** Water quality measurements from capping pilot study.

***Data Table Name:*** cap_water_field

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey period (Pre-capping, During-capping, Post-capping) |
| Type | Sample type (COMP = composite, DISC = discrete, FIELD = field) |
| Cell | Cell being capped (#1A, 1B1, 1B2, 1C2, 1D = subcells; #2, 3, 4 = pilot cells; wedge = centerline area between test and pilot cells) |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Hour | Sample time |
| Location | Sample location (see comment (2)) |
| Wc_dep | Depth of water (feet) |
| Sample_dep | Depth of sample (feet) |
| Temp | Temperature (degrees Celsius) |
| Cond | Specific conductivity (milliSiemens/centimeter) |
| PH | pH (standard units) |
| Turb | Turbidity (nephelometric turbidity units) |
| DO | Dissolved oxygen (milligrams/liter) |
| Stratification | Observation of stratification (Yes or No) |
| Weather | Meteorological conditions reported by field crew |

*(continued)*

**Table 19**
**Data Dictionary for cap_water_field**
**(continued)**

| ***Field Name*** | ***Description*** |
|---|---|
| Constr_Notes | Construction notes reported by field crew |
| Notes | Other notes reported by field crew |

***Notes:***
1. -999 indicates parameter not measured.
2. Descriptions of sampling locations are as follows:

| **Location** | **Description** |
|---|---|
| 1*-N | Subcell 1* – north (1/3 of cell width from north shore) |
| 1*-S | Subcell 1* - south (2/3 of cell width from north shore) |
| DS(T18)-M | Downstream at sediment probing Transect T18 - middle (1/2 of river width from north shore); DS2 |
| DS(T18)-N | Downstream at sediment probing Transect T18 - north (1/2 of river width from north shore); DS1 |
| DS(T18)-S | Downstream at sediment probing Transect T18 - south (3/4 of river width from north shore); DS3 |
| GCA | Southeast side of groin curtain |
| GCB | Northeast side of groin curtain |
| INCELL | Within cell being capped |
| L1 | Subcell local location - adjacent to main channel silt curtain downstream of LD |
| L2 | Subcell local location - most downstream location adjacent to main channel silt curtain |
| LA | Subcell local location - location adjacent to end silt curtain closest to L2 |
| LB | Subcell local location - center location adjacent to end silt curtain |
| LC | Subcell local location - location adjacent to end silt curtain closest shore |
| LD | Subcell local location - adjacent to main channel silt curtain downstream of LE |
| LE | Subcell local location - most upstream location adjacent to main silt curtain |
| LF | Upstream of silt curtain |

*(continued)*

**Table 19**
**Data Dictionary for cap_water_field**
**(continued)**

| Location | Description |
|---|---|
| Main Curtain North (2/3) | Location 30-50 ft downstream of removal activities at 2/3 of river width from north shore |
| Main Curtain South (1/3) | Location 30-50 ft downstream of removal activities at 1/3 of river width from north shore |
| Rt131 | Water column transect at Route 131 Bridge |
| SA | Pilot cell local location - adjacent to end silt curtain nearest to shore |
| SB | Pilot cell local location - location adjacent to end silt curtain |
| SC | Pilot cell local location - most downstream location adjacent to main channel silt curtain downstream of SD |
| SD | Pilot cell local location - adjacent to main channel silt curtain downstream of SE |
| SE | Pilot cell local location - adjacent to main channel silt curtain downstream of SF |
| SF | Pilot cell local location - most upstream location adjacent to main channel silt curtain |
| SG | Upstream of silt curtain |
| SH | Stationary location 20-30 feet downstream of centerline area |
| SI | Roving location 100 feet downstream of placement barge |
| T17-M | Sediment probing Transect T17 - middle (1/2 of river width from north shore) |
| T17-N | Sediment probing Transect T17 - north (1/4 of river width from north shore) |
| T17-S | Sediment probing Transect T17 - south (3/4 of river width from north shore) |
| US(T14)-M | Upstream at sediment probing Transect T14 - middle (1/2 of river width from north shore); US2 |
| US(T14)-N | Upstream at sediment probing Transect T14 - north (1/4 of river width from north shore); US1 |
| US(T14)-S | Upstream at sediment probing Transect T14 - south (3/4 of river width from north shore); US3 |
| USC-A | Downstream of upstream curtain (1/3 of curtain length) |
| USC-B | Downstream of upstream curtain (2/3 of curtain length) |
| WC011 | Water column transect WC011 |

# Environmental Database

*Supplemental Remedial Studies*

This appendix contains the Environmental Database for the Supplemental Remedial Studies (SRS). This database is provided electronically on the enclosed CD. A data dictionary is also included to facilitate use of the database.

**Data Dictionary for SRS Environmental Database**

**Table 1**
**Data Dictionary for art_substrate**

***Data Table Description:*** 1993 RSI Phase II and 1996 SRS Artificial Substrate Studies

***Data Table Name:*** art_substrate ***Related Shapefile:*** artsubs_locat.shp

***Shapefile Location:*** *\data\biota* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Transect

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Survey | | Survey name (RSI Phase II = River and Sediment Investigation Phase II, SRS = Supplemental Remedial Studies) |
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Transect | * | Transect number |
| Location | | Location (A, B, total) |
| Chironomidae *through* Acari | | Number of species identified [3, 4] |
| Tot_indiv | | Total number of individuals identified |
| Tot_taxa | | Total number of taxa identified |

***Comments:***

(1) -999 indicates parameter not measured

(2) * designates fields included within attribute table of shapefile

(3) Species listed (50): Chironomidae, Athericidae, Ceratopogenidae, Molannidae, Polycentropodidae, Leptoceridae, Hydroptilidae, Brachycentridae, Hydropsychidae, Ephemeridae, Heptagenidae, Caenidae, Baetidae, Baetiscidae, Leptophiebiidae, Oligoneuriidae, Tricorythidae, Zygoptera_coen, Anisoptera_mac, Anisoptera_cord, Slalidae, Elmidae_larva, Elmidae_adult, Taeniopterygidae, Pyralidae, Asellidae, Gammaridae, Crangonyctidae, Sididae, Daphniidae, Collembola, Hydracarina, Oligochaeta_misc, Tubificidae, Naididae, Hirudinea, Hirudinoidinea, Tubellaria, Dugesiidae, Pelecypoda, Planorbidae, Physidae, Lynnaeidae, Ancylidae, Dreissenacea, Sphaeriidae, Unionacea, Valvatidae, Nematoda, Acari.

(4) Note: inconsistencies between species name on file and species name listed here are due to an 11 character maximum field limit. Species names on file have been shortened to 11 characters long.

**Table 2**
**Data Dictionary batch_equil**

***Data Table Description:*** Batch equilibrium study performed by Carnegie Mellon University

***Data Table Name:*** batch_equil ***Related Shapefile:*** N/A

***Shapefile Location:*** N/A ***Shapefile Source:*** N/A

***Key Item:*** N/A

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Survey | | Survey name (SRS = Supplemental Remedial Studies) |
| PInv | | Principal Investigator (CMU = Carnegie Mellon University) |
| Lab | | Laboratory where sample was analyzed (ATC = Alcoa Technical Center) |
| Month | | Sample month |
| Day | | Sample day |
| Year | | Sample year |
| Column | | Column number |
| Sample_id | | Sample identification code |
| Sed_mix | | Sediment mixture (BS2, BS3, BS2:BS1, BS3:BS1,BS3:GAC) |
| Drywt_ratio | | Dry weight ratio of sediment mixture |
| Type | | Sample type (water, blank) |
| BZ_corr | | BZ correction applied? |
| BZ_1 *through* BZ_209 | | BZ_# concentration, where # = numbers 1 through 209 (nanograms/liter) |
| Tot_PCB_bz | | BZ total PCB concentration (nanograms/liter) |
| Mono *through* Deca | | #chlorinated biphenyl, where # = mono, di, tri, tetra, penta, hexa, hepta, octa, nona, and deca (weight percent) |
| Ortho | | Ortho-chlorines per biphenyl |

*(continued)*

**Table 2**
**Data Dictionary batch_equil**
**(continued)**

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Meta | | Meta-chlorines per biphenyl |
| Para | | Para-chlorines per biphenyl |
| Clbp | | Chlorines per biphenyl |

***Comments:***
(1) -999 indicates parameter not measured

**Table 3**
**Data Dictionary for benthic_comm**

***Data Table Description:*** 1993 RSI Phase II, 1996 SRS and 1998 PBTS benthic community studies

***Data Table Name:*** benthic_comm ***Related Shapefile:*** benthic_locat.shp

***Shapefile Location:*** *\data\biota* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Transect

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Survey | | Survey name (PBTS = Particle Broadcasting Treatability Study, RSI Phase II = River and Sediment Investigation Phase II, SRS= Supplemental Remedial Studies) |
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Transect | * | Transect number |
| Location | | Location (A1-3, B1-3, C1-5, N1-5, S1-5, total) |
| Chironomidae *through* Acari | | Number of species identified [3, 4] |
| Tot_indiv | | Total number of individuals identified |
| Tot_taxa | | Total number of taxa identified |

***Comments:***

(1) -999 indicates parameter not measured

(2) * designates fields included within attribute table of shapefile

(3) Species listed (51): Chironomidae, Athericidae, Ceratopogenidae, Molannidae, Polycentropodidae, Leptoceridae, Hydroptilidae, Brachycentridae, Hydropsychidae, Ephemeridae, Heptagenidae, Caenidae, Baetidae, Baetiscidae, Leptophiebiidae, Oligoneuriidae, Tricorythidae, Zygoptera_coen, Anisoptera_mac, Anisoptera_cord, Slalidae, Elmidae_larva, Elmidae_adult, Elmidae, Taeniopterygidae, Pyralidae, Asellidae, Gammaridae, Crangonyctidae, Sididae, Daphniidae, Collembola, Hydracarina, Oligochaeta_misc, Tubificidae, Naididae, Hirudinea, Hirudinoidinea, Tubellaria, Dugesiidae, Pelecypoda, Planorbidae, Physidae, Lynnaeidae, Ancylidae, Dreissenacea, Sphaeriidae, Unionacea, Valvatidae, Nematoda, Acari.

(4) Note: inconsistencies between species name on file and species name listed here are due to an 11 character maximum field limit. Species names on file have been shortened to 11 characters long.

**Table 4**
**Data Dictionary for cap_thickness**

***Data Table Description:*** Cap thickness and sediment elevation measured within the Capping Pilot Study area in May 2003

***Data Table Name:*** cap_thickness ***Related Shapefiles:*** cap_thickness_locat.shp

***Shapefiles Location:*** *\data\sed_qual* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Key

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Key | * | Key identification for linking to Access database (Key = Round, Point_ID) |
| Survey | | Survey period (Pre-PhaseI = prior to Phase I sampling in 2003) |
| Year | | Sample year |
| Month | | Sample month |
| Round | | Sample round |
| Cell | | Cell in which sample was collected (#2, 3, 4 = pilot cells) |
| Point_ID | | Point identification code |
| Northing | * | 1983 NY State Plane northing (feet) |
| Easting | * | 1983 NY State Plane easting (feet) |
| Sed_elev | | Elevation of top of sediment (feet) |
| Cap_thick | | Cap thickness calculated (feet) |

***Comments:***
(1) Negative numbers for cap thickness indicate a loss of cap and native sediment compared to sediment elevations from the pre-capping survey. Positive numbers indicate the presence of native sediment and/or cap material; the thickness of cap material placed varied depending on the test area.
(2) Sediment elevations based on USLS 35

**Table 5**
**Data Dictionary for climate**

***Data Table Description:*** Daily meteorological data measured at Alcoa Building 65 or near Outfall 007 (1/1/1992 – 12/31/2008)

***Data Table Name:*** climate ***Related Shapefile:*** climate_locat.shp

***Shapefile Location:*** *\data\climate* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Location

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Location | * | Location identifier (BLD65 = Alcoa Building 65, OF007 = near Outfall 007) |
| Northing | * | Estimated 1983 NY State Plane Northing |
| Easting | * | Estimated 1983 NY State Plane Easting |
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Air_temp | | Average air temperature (degrees Fahrenheit) |
| Rel_hum | | Average relative humidity (%) |
| Bar_press | | Average barometric pressure (inches Hg) |
| Wind_spd | | Average wind speed (miles/hour) |
| Wind_dir | | Average wind direction (degrees from North) |
| Precip | | Precipitation (inches) |

***Comments:***
(1) –999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile

**Table 6**
**Data Dictionary for column_flux**

***Data Table Description:*** Column flux studies performed at Carnegie Mellon University

***Data Table Name:*** column_flux ***Related Shapefile:*** N/A

***Shapefile Location:*** N/A ***Shapefile Source:*** N/A

***Key Item:*** N/A

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Survey | | Survey name (SRS = Supplemental Remedial Studies) |
| PInv | | Principal Investigator (CMU = Carnegie Mellon University) |
| Lab | | Laboratory where sample was analyzed (ATC = Alcoa Technical Center) |
| Month | | Sample month |
| Day | | Sample day |
| Year | | Sample year |
| Column | | Column identification number |
| Sed_mix | | Sediment mixture (BS1, BS2, BS3, BS2:BS1, BS3:BS1, BS3:GSC) |
| Drywt_ratio | | Dry weight ratio of sediment mixture |
| Type | | Sample type (blank, water) |
| BZ_corr | | BZ correction applied? |
| BZ_1 *through* BZ_209 | | BZ_# concentration, where # = numbers 1 through 209 (nanograms/liter) |
| Tot_PCB_bz | | BZ total PCB concentration (nanograms/liter) |
| Mono *through* Deca | | #chlorinated biphenyl, where # = mono, di, tri, tetra, penta, hexa, hepta, octa, nona, deca. (weight percent) |
| Ortho | | Ortho-chlorines per biphenyl |
| Meta | | Meta-chlorines per biphenyl |

*(continued)*

**Table 6**
**Data Dictionary for column_flux**
**(continued)**

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Para | | Para-chlorines per biphenyl |
| Clbp | | Chlorines per biphenyl |

***Comments:***
(1) -999 indicates parameter not measured

**Table 7**
**Data Dictionary for dye_study**

***Data Table Description:*** 1997 SRS dye study

***Data Table Name:*** dye_study ***Related Shapefile:*** dyestudy_locat.shp

***Shapefile Location:*** *\data\water_qual* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Transect

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Survey | | Name of Survey (SRS = Supplemental Remedial Studies) |
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Hour | | Sample hour |
| Transect | * | Transect number (D5A = outfall 001 mixing basin) |
| Station | | Station identifier, N = north, M = middle, S = south, INCURT = inside outfall 001 curtain, SHPILE = inside outfall 001 sheet piling) |
| Wc_dep | | Water column depth (feet) |
| Type | | Sample type (DISC = discrete, GRAB = grab) |
| Sample_dep | | Sample depth (feet) |
| Cond | | Specific conductivity (milliSiemens/centimeter) |
| Temp | | Water temperature (degrees Celsius) |
| Dye | | Dye concentration (micrograms/liter) |

***Comments:***
(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile

**Table 8**
**Data Dictionary for gw_seepage**

***Data Table Description:*** Fall 1998 and Spring 1999 groundwater seepage measurements

***Data Table Name:*** gw_seepage ***Related Shapefile:*** gw_seepage_locat.shp

***Shapefile Location:*** *\data\water_qual* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Transect

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Year | | Sample year |
| Month_depl | | Month water collection bag was deployed |
| Day_depl | | Day water collection bag was deployed |
| Month_retr | | Month water collection bag was retrieved |
| Day_retr | | Day water collection bag was retrieved |
| Duration | | Number of days water collection bag remained in River |
| Round | | Round number |
| Transect | * | Transect |
| Location | | Location along transect |
| Meter | | Meter identification for paired groundwater seepage meters |
| Gw_flux | | Groundwater flux (liter per square meter per day) |

***Comments:***
(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile

**Table 9**
**Data Dictionary for mussel_aro**

***Data Table Description:*** 1998 SRS caged mussel data (Aroclor)

***Data Table Name:*** mussel_aro ***Related Shapefile:*** mussel_locat.shp

***Shapefile Location:*** *\data\biota* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Transect

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Survey | | Survey name (SRS = Supplemental Remedial Studies) |
| Lab | | Laboratory where samples were analyzed (NEA = Northeast Analytical, Inc.) |
| Lab_id | | Laboratory identification code |
| Sample_id | | Sample identification code |
| Year | | Sample year |
| Month_depl | | Month sample was deployed |
| Day_depl | | Day sample was deployed |
| Month_retr | | Month sample was retrieved |
| Day_retr | | Day sample was retrieved |
| Duration | | Number of days mussels remained in River |
| Transect | * | Transect number |
| Wc_dep | | Water depth (feet) |
| Cage_dep | | Cage depth (feet) |
| No_mussel | | Number of mussels in composite |
| Weight | | Total weight (grams) |
| Tissue | | Mussel tissue analyzed |

*(continued)*

**Table 9**
**Data Dictionary for mussel_aro**
**(continued)**

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Per_lipid | | Percent lipids (%) |
| A_1016 *through* A_ 1260 | | Aroclor_# concentration, where # = 1016, 1221, 1232, 1242, 1248, 1254, 1260 (nanograms/gram dry weight) |
| Tot_PCB_aro | | Aroclor total PCB concentration (nanograms/gram dry weight) |

***Comments:***

(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile
(3) Negative numbers (other than –999) indicate the concentration was below the detection limit (DL), i.e. –124 means the concentration was less than the DL of 124 nanograms/gram dry weight.

**Table 10**
**Data Dictionary for mussel_bz**

***Data Table Description:*** 1998 SRS caged mussel data (BZ)

***Data Table Name:*** mussel_bz ***Related Shapefile:*** mussel_locat.shp

***Shapefile Location:*** *\data\biota* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Transect

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Survey | | Survey name (SRS = Supplemental Remedial Studies) |
| Lab | | Laboratory where samples were analyzed (ATC = Alcoa Technical Center) |
| Lab_id | | Laboratory identification code |
| Sample_id | | Sample identification code |
| Year | | Sample year |
| Month_depl | | Month sample was deployed |
| Day_depl | | Day sample was deployed |
| Month_retr | | Month sample was retrieved |
| Day_retr | | Day sample was retrieved |
| Duration | | Number of days mussel remained in River |
| Transect | * | Transect number |
| Wc_dep | | Water depth (feet) |
| Cage_dep | | Cage depth (feet) |
| Tissue | | Mussel tissue analyzed |
| Weight | | Total weight (grams) |
| Per_lipid | | Percent lipids (%) |
| BZ_1 *through* BZ_209 | | BZ_# concentration, where # = numbers 1 through 209 (nanograms/gram dry weight) |

*(continued)*

**Table 10**
**Data Dictionary for mussel_bz**
**(continued)**

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Tot_PCB_bz | | BZ total PCB concentration (nanograms/gram dry weight) |
| Mono *through* Deca | | #chlorinated biphenyl, where # = mono, di, tri, tetra, penta, hexa, hepta, octa, nona, deca (weight percent) |
| Ortho | | Ortho-chlorines per biphenyl |
| Meta | | Meta-chlorines per biphenyl |
| Para | | Para-chlorines per biphenyl |
| Clbp | | Chlorines per biphenyl |

***Comments:***
(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile

**Table 11**
**Data Dictionary for outfall_storms**

***Data Table Description:*** 1997 Storm event sampling

***Data Table Name:*** outfall_storms ***Related Shapefile:*** outfall_locat.shp

***Shapefile Location:*** *\data\outfalls_tributaries* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Location

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Survey | | Survey name (SRS = Supplemental Remedial Studies) |
| Lab | | Laboratory where sample was analyzed (ATC =Alcoa Technical Center) |
| Lab_id | | Laboratory identification number |
| Sample_id | | Sample identification code |
| Dupe | | Is there a duplicate sample? (DUP = yes, blank = no) |
| Type | | Sample type (QA/QC = quality assurance/quality control, TOTAL = total unfiltered sample) |
| Description | | Sample description (QA/QC = quality assurance/quality control, DISC = discrete) |
| Storm | | Storm number |
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Hour | | Sample hour |
| Location | * | Sample location (001 = Outfall 001, 004 = Outfall 004, 42I = 42-inch pipe, 30I = 30-inch pipe, UNT = Unnamed Tributary, 60A = 60-Acre Lagoon) |
| Northing | * | Estimated 1983 NY State Plane Northing (feet) |
| Easting | * | Estimated 1983 NY State Plane Easting (feet) |
| Flow | | Flow (gallons/minute) |
| Temp | | Water temperature (degrees Celsius) |

*(continued)*

**Table 11**
**Data Dictionary for outfall_storms**
**(continued)**

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| TSS | | Total Suspended Solids (milligrams/liter) |
| VSS | | Volatile Suspended Solids (milligrams/liter) |
| POC | | Particulate Organic Carbon (milligrams/liter) |
| Calib_corr | | Calibration correction applied? |
| Bias_corr | | Bias correction applied? |
| BZ_corr | | BZ correction applied? |
| BZ_1 *through* BZ_209 | | BZ_# concentration, where # = numbers from 1 through 209 (nanograms/liter) |
| Tot_PCB_bz | | BZ total PCB concentration (nanograms/liter) |
| Mono *through* Deca | | #chlorinated biphenyl, where # = mono, di, tri, tetra, penta, hexa, hepta, octa, nona, and deca (weight percent) |
| Ortho | | Ortho-chlorines per biphenyl |
| Meta | | Meta-chlorines per biphenyl |
| Para | | Para-chlorines per biphenyl |
| Clbp | | Chlorines per biphenyl |

***Comments:***
(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile

**Table 12**
**Data Dictionary for pelagic_comm**

***Data Table Description:*** 1998 PBTS Pelagic Community Study

***Data Table Name:*** pelagic_comm ***Related Shapefile:*** pelagic_locat.shp

***Shapefile Location:*** *\data\biota* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Transect

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Survey | | Survey name (PBTS = Particle Broadcasting Treatability Study) |
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Transect | * | Transect number |
| Location | | Sample location across transect (north, center, south, total) |
| Chironomidae *through* Acari | | Number of species identified [3, 4] |
| Tot_indiv | | Total number of individuals identified |
| Tot_taxa | | Total number of taxa identified |

***Comments:***

(1) -999 indicates parameter not measured

(2) * designates fields included within attribute table of shapefile

(3) Species listed (51): Chironomidae, Athericidae, Ceratopogenidae, Molannidae, Polycentropodidae, Leptoceridae, Hydroptilidae, Brachycentridae, Hydropsychidae, Ephemeridae, Heptagenidae, Caenidae, Baetidae, Baetiscidae, Leptophiebiidae, Oligoneuriidae, Tricorythidae, Zygoptera_coen, Anisoptera_mac, Anisoptera_cord, Slalidae, Elmidae_larva, Elmidae_adult, Elmidae, Taeniopterygidae, Pyralidae, Asellidae, Gammaridae, Crangonyctidae, Sididae, Daphniidae, Collembola, Hydracarina, Oligochaeta_misc, Tubificidae, Naididae, Hirudinea, Hirudinoidinea, Tubellaria, Dugesiidae, Pelecypoda, Planorbidae, Physidae, Lynnaeidae, Ancylidae, Dreissenacea, Sphaeriidae, Unionacea, Valvatidae, Nematoda, Acari.

(4) Note: inconsistencies between species name on file and species name listed here are due to an 11 character maximum field limit. Species names on file have been shortened to 11 characters long.

**Table 13**
**Data Dictionary for resfish_aro**

***Data Table Description:*** 1991 RSI Phase I, 1993 RSI Phase II, 1995 Post-NTCRA, 1996-2008 TMS, and 1998-1999 YOY resident fish data (Aroclor)

*Data Table Name:* resfish_aro

*Related Shapefiles:* resfish_RSI1_locat.shp, resfish_RSI2_TMS_locat.shp, resfish_RSI2_TMS_shiner_locat.shp, resfish_SRS_locat.shp, resfish_yoy_locat.shp, resfish_bbul_smbs_coords.shp

***Shapefile Location:*** *\data\biota*

***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Key (resfish_bbul_smbs_coords.shp); Location (all other shapefiles)

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Key | * | Key identification for linking to Access database (Key = Year, Sample ID) |
| Survey | | Survey name (RSI Phase I and Phase II = River and Sediment Investigation Phase I and II, Post-NTCRA = Post-Non-Time-Critical Removal Action, TMS = Trend Monitoring Survey, YOY = Young-of-the-Year Monitoring Program) |
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Lab_id | | Laboratory identification code |
| Sample_id | | Sample identification code |
| Lab | | Lab where samples were analyzed (EEASC = Ecology and Environment Analytical Services Center, EnChem, HES = Hazelton Environmental Services, NEA = Northeast Analytical, Inc.) |
| Species | | Species being analyzed (BBUL = Brown Bullhead, NRPK = Northern Pike, PKSD = Pumpkinseed, RKBS = Rock Bass, SHIN = Spottail Shiner, SMBS = Smallmouth Bass, WLEY = Walleye) |
| Tissue | | Fish portion being analyzed (CARC = carcass, FILL = fillet, VISC = viscera, WHOL = whole fish) |
| Location | * | Location (BACK = Background, DS-ENA = Further downstream of Outfall 001, ENA = Downstream of Outfall 001, GR_UT = Unnamed Tributary, LOWR = Lower Stretch, MIDL = Middle Stretch, MOUTH = River Mouth for spottail shiner or Mouth Stretch for smallmouth bass and brown bullhead, OF001 = Near Outfall 001, PC = Power Canal, UPPR = Upper Stretch, RCH# = Reach Number) |

*(continued)*

**Table 13**
**Data Dictionary for resfish_aro**
**(continued)**

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Northing | | Estimated 1983 NY State Plane Northing (feet) |
| Easting | | Estimated 1983 NY State Plane Easting (feet) |
| No_fish | | Number of fish in composite |
| Min_length | | Minimum length of fish (centimeters; applies to composite samples only) |
| Max_length | | Maximum length of fish (centimeters; applies to composite samples only) |
| Length | | Length of fish (centimeters) |
| Tiss_weight | | Weight of tissue analyzed (grams) |
| Tot_weight | | Total weight of fish (grams) |
| Per_lip | | Percent lipids (%) |
| Calib_corr | | Calibration correction applied? |
| Bias_corr | | Bias correction applied? |
| BZ_corr | | BZ correction applied? |
| A_1016 *through* A_ 1260 | | Aroclor_# concentration, where # = 1216, 1221, 1232, 1242, 1248, 1254, 1260 (milligrams/kilogram wet weight) |
| Tot_PCB_aro | | Aroclor total PCB concentration (milligrams/kilogram wet weight) |
| Col_type | | Column type used for analysis (DB1_cap = capillary, PCK_col = packed column) |
| Per_rec | | Laboratory spike percent recovery (%) |

***Comments:***
(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile
(3) Negative numbers (other than -999) indicate the concentration was below the detection limit (DL), i.e. -124 means the concentration was less than the DL of 124 milligrams per kilogram wet-weight

**Table 14**
**Data Dictionary for resfish_bz**

***Data Table Description:*** 1995 Post-NTCRA, 1996-1998 TMS, and 1999 YOY resident fish data (BZ)

***Data Table Name:*** resfish_bz

***Related Shapefiles:*** resfish_RSI1_locat.shp, resfish_RSI2_TMS_locat.shp, resfish_RSI2_TMS_shiner_locat.shp, resfish_SRS_locat.shp, resfish_yoy_locat.shp

***Shapefile Location:*** *\data\biota*

***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Location

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Survey | | Survey name (Post-NTCRA = Post-Non-Time-Critical Removal Action, TMS = Trend Monitoring Surveys, YOY = Young-of-the-Year Monitoring Program) |
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Lab_id | | Laboratory identification number |
| Sample_id | | Sample identification number |
| Lab | | Lab where sample was analyzed (ATC = Alcoa Technical Center) |
| Species | | Species being analyzed (BBUL = Brown Bullhead, PKSD = Pumpkinseed, SHIN = Spottail Shiner, SMBS = Smallmouth Bass ) |
| Tissue | | Fish tissue being analyzed (CARC = carcass, FILL = fillet, WHOL = whole fish) |
| Location | * | Location (BACK = Background, DS-ENA = Further downstream of Outfall 001, ENA = Downstream of Outfall 001, LOWR = Lower Stretch, MIDL = Middle Stretch, MOUTH = River Mouth, UPPR = Upper Stretch) |
| Size | | Fish size (HIGH = high, MED = medium, LOW = low) |
| No_fish | | Number of fish in composite |
| Min_length | | Minimum length of fish (centimeters; applies to composite samples only) |
| Max_length | | Maximum length of fish (centimeters; applies to composite samples only) |

*(continued)*

**Table 14**
**Data Dictionary for resfish_bz**
**(continued)**

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Length | | Length of fish (centimeters) |
| Tiss_weight | | Weight of tissue analyzed (grams) |
| Tot_weight | | Total weight of fish (grams) |
| Per_lip | | Percent lipids (%) |
| Calib_corr | | Calibration correction applied? |
| Bias_corr | | Bias correction applied? |
| BZ_corr | | BZ correction applied? |
| BZ_1 *through* BZ_209 | | BZ_# concentration, where # = numbers 1 through 209 (milligrams/kilogram wet weight) |
| Tot_PCB_bz | | BZ total PCB concentration (milligrams/kilogram wet weight) |
| Mono *through* Deca | | #chlorinated biphenyl, where # = mono, di, tri, tetra, penta, hexa, hepta, octa, nona, deca (weight percent) |
| Ortho | | Ortho-chlorines per biphenyl |
| Meta | | Meta-chlorines per biphenyl |
| Para | | Para-chlorines per biphenyl |
| Clbp | | Chlorines per biphenyl |

***Comments:***
(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile

**Table 15**
**Data Dictionary for resfish_peak**

***Data Table Description:*** 1995 Pre-NTCRA, 1996 SRS, 1999-2003 TMS, and 1999 YOY resident fish data (peak)

***Data Table Name:*** resfish_peak

***Related Shapefiles:*** resfish_SRS_locat.shp, resfish_TMS_locat.shp, resfish_yoy_locat.shp, resfish_bbul_smbs_coords.shp

***Shapefile Location:*** *\data\biota*

***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Key (resfish_bbul_smbs_coords.shp)
Location (all other shapefiles)

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Key | * | Key identification for linking to Access database (Key = Year, Sample ID) |
| Survey | | Survey name (Pre-NTCRA =Pre-Non-Time-Critical Removal Action , SRS = Supplemental Remedial Studies, TMS = Trend Monitoring Survey, YOY = Young-of-the-Year Monitoring Program) |
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Lab_id | | Laboratory identification code |
| Sample_id | | Sample identification number |
| Lab | | Laboratory where sample was analyzed (NEA = Northeast Analytical, Inc.) |
| Species | | Species being analyzed (BBUL = Brown Bullhead, SHIN = Spottail Shiner, SMBS = Smallmouth Bass) |
| Tissue | | Fish portion being analyzed (CARC = carcass, FILL = fillet, WHOL = whole fish) |
| Location | * | Location (BACK = Background , DS001 = Downstream of Outfall 001, DS-ENA = Further downstream of Outfall 001, DSUT = Downstream of Unnamed Tributary, ENA = Downstream of Outfall 001, GR_UT = Unnamed Tributary, LOWR = Lower Stretch, MIDL = Middle Stretch, MOUTH = River Mouth for spottail shiner or Mouth Stretch for smallmouth bass and brown bullhead, OF001 = Near Outfall 001, PC = Power Canal, UPPR = Upper Stretch, US001 = Upstream of Outfall 001 , USUT = Upstream of Unnamed Tributary) |

*(continued)*

**Table 15**
**Data Dictionary for resfish_peak**
**(continued)**

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Northing | | Estimated 1983 NY State Plane Northing (feet) |
| Easting | | Estimated 1983 NY State Plane Easting (feet) |
| Size | | Fish size (LRG = large, MED = medium , SML = small) |
| No_fish | | Number of fish in composite |
| Min_length | | Minimum length of fish (centimeters; applies to composite samples only) |
| Max_length | | Maximum length of fish (centimeters; applies to composite samples only) |
| Length | | Length of fish (centimeters) |
| Tiss_weight | | Weight of tissue analyzed (grams) |
| Tot_weight | | Total weight of fish (grams) |
| Per_lip | | Percent lipids (%) |
| Calib_corr | | Calibration correction applied? |
| Bias_corr | | Bias correction applied? |
| BZ_corr | | BZ correction applied? |
| PK_1 *through* PK_118 | | PK_# concentration, where # = numbers 1 through 118 (milligrams/kilogram wet weight) |
| Tot_PCB_pk | | Peak total PCB concentration (milligrams/kilogram wet weight) |
| Mono *through* Deca | | #chlorinated biphenyl, where # = mono, di, tri, tetra, penta, hexa, hepta, octa, nona, deca (weight percent) |
| Ortho | | Ortho-chlorines per biphenyl |
| Meta_Para | | Sum of Meta-chlorines per biphenyl and Para-chlorines per biphenyl |
| Clbp | | Chlorines per biphenyl |

Comments:
(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile

**Table 16**
**Data Dictionary for riverflow_ChaseMills**

***Data Table Description:*** Flow records for the Grasse River at Chase Mills (USGS Gage 04265432), recorded every 15 minutes (9/25/2003 – 12/31/2008)

***Data Table Name:*** riverflow_ChaseMills ***Related Shapefile:*** cmills_osweg_locat.shp

***Shapefile Location:*** *\data\riverflow* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Location

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Location | * | Location identifier (CMills = Chase Mills records) |
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Minute | | Sample Minute |
| Gage_height | | River water level (feet) |
| Flow | | Flow (cubic feet/second) |

***Comments:***
(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile

**Table 17**
**Data Dictionary for riverflow_hist**

***Data Table Description:*** Historic (estimated) flow records for the Grasse River at Massena (7/1/1916 – 12/31/2008)

***Data Table Name:*** riverflow_hist ***Related Shapefile:*** cmills_osweg_locat.shp

***Shapefile Location:*** *\data\riverflow* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Location

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Location | * | Location identifier (HIST = historic records) |
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Northing | | Estimated 1983 NY State Plane Northing |
| Easting | | Estimated 1983 NY State Plane Easting |
| Osw_flow | | West Branch of Oswegatchie River flow at Harrisville (USGS Gage 04262500; cubic feet/second) |
| GRp_flow | | Grasse River flow at Pyrites (USGS Gage 04265000; cubic feet/second) |
| GRm_flow | | Estimated Grasse River flow at Massena (cubic feet/second) |

***Comments:***
(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile
(3) Grasse River flow at Massena (GRm_flow) estimated from Pyrites River flow, when available, otherwise estimated from Oswegatchie River flow.

**Table 18**
**Data Dictionary for riverflow_tapedown**

***Data Table Description:*** Paired tapedown measurements from Main Street Bridge and measured flows at Transect WC001 (1997-1999, 2001-2005) and WCMSB (2007-2008)

***Data Table Name:*** tapeflow ***Related Shapefile:*** tapeflow_locat.shp

***Shapefile Location:*** *\data\riverflow* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Location

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Survey | | Survey name (During NTCRA = During-Non-Time-Critical Removal Action, Post-NTCRA = Post-Non-Time-Critical Removal Action, SRS = Supplemental Remedial Studies, SRS/Capping = During Supplemental Remedial Studies and Capping Pilot Program) |
| Location | * | Location identifier (WC001 = water column transect WC001, WCMSB-L = water column transect WCMSB at the north side of the river, WCMSB-M = water column transect WCMSB mid-channel, WCMSB-R = water column transect WCMSB at the south side of the river) |
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Hour | | Sample hour |
| Northing | * | Estimated 1983 NY State Plane Northing |
| Easting | * | Estimated 1983 NY State Plane Easting |
| Tape_dep | | Tapedown measurement from Main St. Bridge (feet) |
| Meas_flow | | Measured flow at water column Transect (cubic feet/second) |

***Comments:***
(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile

**Table 19**
**Data Dictionary for riverflow_trans**

***Data Table Description:*** Flows estimated from pressure transducer measurements taken at the Main Street Bridge (1/1/1997 – 12/31/2000) and Outfall 001 (1/1/2004 – 12/31/2008)

***Data Table Name:*** riverflow_trans ***Related Shapefile:*** transflow_locat.shp

***Shapefile Location:*** *\data\riverflow* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Location

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Location | * | Location identifier (MSB = Main St. Bridge) |
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Hour | | Sample hour |
| Northing | * | Estimated 1983 NY State Plane Northing |
| Easting | * | Estimated 1983 NY State Plane Easting |
| Trans_dep | | Pressure transducer reading (feet) |
| Temp | | Water temperature (degrees Celsius) |
| Tape | | Tapedown measurement (feet) |
| EQ | | Estimated flow (cubic feet per second) |

***Comments:***
(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile

**Table 20**
**Data Dictionary for sed_probe**

***Data Table Description:*** 1992, 2001, 2003, and 2004 sediment probing data

***Data Table Name:*** sed_probe ***Related Shapefile:*** sed_probe_locat.shp

Shapefile Location: \data\sed_qual Shapefile Source: Imported by hand at QEA

***Key Item:*** Point_ID

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Survey | * | Survey name (1992Probing = survey conducted in 1992, 2001Probing = survey conducted in 2001, Pre-PhaseI = prior to 2003 Phase I, PhaseI = 2003 Phase I, PhaseII = 2004 Phase II continuation, Focused = Focused Studies) |
| Point_id | * | Sample identification code to link data with characterization data in sediment_char, if applicable |
| Year | * | Sample year |
| Transect | * | Sediment probing transect number (Transect = transect # + distance downstream of transect in feet) |
| Northing | * | 1983 NY State Plane Northing (feet) |
| Easting | * | 1983 NY State Plane Easting (feet) |
| Water_elev | * | Water elevation (feet) |
| Sed_elev | * | Sediment elevation (feet) |
| Dist_from_NS | * | Distance from north shore (feet) |
| Water_dep | * | Depth of water (feet) |
| SS_dep | * | Depth of soft sediment (feet) |
| Sed_dep | | Total depth of sediment (feet) |
| Comments | * | Notes reported by field crew |

***Comments:***

(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile
(3) Sample endings for the "Point_id" indicate the following:
**"A" –**northern shore**; "B"** –southern shore; **"EWA" –** edge of water; **"BB" –** southern bank; **"(SAMPLE)"** – core collected for grain size, % solids, and bulk density analyses (see sediment_char)
(4) Water and sediment elevations based on USLS 35
(5) Northings and Eastings for points along WC001 were estimated in GIS using reference points WC001-A, WC001-B, and distance from north shore.

**Table 21**
**Data Dictionary for sediment_aro**

***Data Table Description:*** 1991 RSI Phase I, 1993 RSI Phase II, 1995 Pre-NTCRA, 1997 SRS, 2000-2001 SSS, 2001 Pre-Capping, 2003 Phase II, January 2004, 2004 Focused Studies sediment data, 2006 Phase I (Aroclor), and 2007 Phase II (Aroclor)

***Data Table Name:*** sediment_aro ***Related Shapefiles:*** sediment_aro_locat.shp

***Shapefiles Location:*** *\data\sed_qual* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Key

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Key | * | Key identification for linking to Access database (Key = Sample_id, Start_dep, End_dep) |
| Year | * | Sample year |
| Month | * | Sample month |
| Day | * | Sample day |
| Survey | * | Survey name (SRS = Supplemental Remedial Studies, RSI Phase I/ RSI Phase II = River and Sediment Investigation Phase I/Phase II, Pre-NTCRA = Pre-Non-Time-Critical Removal Action, SSS = Supplemental Sediment Sampling, Pre-Capping = prior to Capping Pilot Study, PhaseII = 2003 Phase II, Jan2004 = January 2004, Focused = Focused Studies, 2006PhaseI = 2006 Phase I Vibracore, 2007Phase2 = 2007 Phase II Vibracore |
| Lab | | Laboratory where samples were analyzed (EEASC = Ecology and Environment Analytical Services Center, ITAS =IT Analytical Services, MSS = Mass Spec Services, NEA = Northeast Analytical, Inc.) |
| Lab_id | | Laboratory identification number |
| Sample_id | * | Sample identification code |
| Dup | | Indication of sample duplicate (DUP = yes, blank = no) |
| Type | * | Sample type (core, grab, or qaqc = quality assurance/quality control) |
| Northing | * | 1983 NY State Plane Northing (feet) |
| Easting | * | 1983 NY State Plane Easting (feet) |

*(continued)*

**Table 21**
**Data Dictionary for sediment_aro**
**(continued)**

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Location | | Identifies area where sample was collected; used to identify the original sample for duplicates |
| Start_dep | * | Starting depth of sample |
| End_dep | * | Ending depth of sample |
| Dep_units | * | Units of depth of measured sample |
| A_1016 *through* A_1260 | | Aroclor_# concentration, where # = 1016, 1221, 1232, 1242, 1248, 1254, 1260 (milligrams/kilogram dry weight) |
| Tot_PCB_aro | | Aroclor total PCB concentration (milligrams/kilogram dry weight) |
| Qual_PCB | | Qualifiers for total PCBs (J = estimated) |
| Ar | | Arsenic (milligrams/kilogram dry weight) |
| Cyn | | Cyanide (milligrams/kilogram dry weight) |
| Tot_Fl | | Total Fluoride (milligram/kilogram dry weight) |
| Sol_Fl | | Soluble Fluoride (milligram/kilogram dry weight) |
| Al | | Aluminum (milligram/kilogram dry weight) |
| Cd | | Cadmium (milligram/kilogram dry weight) |
| Pb | | Lead (milligram/kilogram dry weight) |
| Diox | | Dioxins (milligram/kilogram dry weight) |
| Fur | | Furans (milligram/kilogram dry weight) |
| TEF | | Toxicity Equivalence Factors |
| PAH | | Polycyclic Aromatic Hydrocarbons (milligram/kilogram dry weight) |
| Benz | | Benzenes (milligram/kilogram dry weight) |

*(continued)*

**Table 21**
**Data Dictionary for sediment_aro**
**(continued)**

| *Field Name* | *GIS* | *Description* |
|---|---|---|
| Org_matter | | Organic matter (milligram/kilogram dry weight) |
| TOC | | Total Organic Carbon (milligram/kilogram dry weight) |
| Soil_type | | Physical description of sediment sample |
| Oil_gr | | Oil and grease (milligram/kilogram dry weight) |
| PH | | pH (standard units) |
| Spec_grav | | Specific gravity |
| Per_solids | | Percent solids (%) |
| Cs_137 | | Cesium-137 (picoCurie/gram dry weight) |
| Be_7 | | Berillium-7 (picoCurie/gram dry weight) |
| B_dens | | Bulk density (grams/milliliter) |
| Per_moist | | Percent moisture (%) |
| Per_rec | | Laboratory spike percent recovery (%) |
| Notes | | Qualifiers for lead and cadmium data from 1991 |
| Status | | Data usability (current = data reflects current sediment conditions, historic = data does not reflect current conditions, QAQC = quality assurance/quality control) |

***Comments:***

(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile
(3) Negative numbers (other than -999) indicate the concentration was below the detection limit (DL), i.e. -124 means the concentration was less than the DL of 124 milligrams per kilogram dry-weight.
(4) Descriptions for all samples (including portions of cores not submitted for analysis) collected during 2004 Focused Studies field activities can be found in the photo log in Appendix C.

**Table 22**
**Data Dictionary for sediment_bank**

***Data Table Description:*** Sediment data from river banks (Aroclor)

***Data Table Name:*** sediment_bank ***Related Shapefiles:*** sediment_bank_locat.shp

***Shapefiles Location:*** *\data\sed_qual* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Transect

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Survey | | Survey name (PhaseII = 2003 Phase II) |
| Lab | | Laboratory where samples were analyzed (NEA = Northeast Analytical, Inc.) |
| Lab_id | | Laboratory identification number |
| Sample_id | | Sample identification code |
| Dupe | | Indication of sample duplicate (DUP = yes, blank = no) |
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Type | | Sample type (QA/QC = quality assurance/quality control, comp = composite) |
| Transect | * | Transect number |
| Trans_length | | Length of transect (feet) |
| Northing1 | | 1983 NY State Plane Northing for 1/3 of composite (feet) |
| Easting1 | | 1983 NY State Plane Easting for 1/3 of composite (feet) |
| Northing2 | | 1983 NY State Plane Northing for 1/3 of composite (feet) |
| Easting2 | | 1983 NY State Plane Easting for 1/3 of composite (feet) |
| Northing3 | | 1983 NY State Plane Northing for 1/3 of composite (feet) |

*(continued)*

**Table 22**
**Data Dictionary for sediment_bank**
**(continued)**

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Easting3 | | 1983 NY State Plane Easting for 1/3 of composite (feet) |
| Start_dep | | Starting depth of sample |
| End_dep | | Ending depth of sample |
| Dep_units | | Units of depth of measured sample |
| A_1016 *through* A_1260 | | Aroclor_# concentration, where # = 1016, 1221, 1232, 1242, 1248, 1254, 1260 (milligrams/kilogram dry weight) |
| Tot_PCB_aro | | Aroclor total PCB concentration (milligrams/kilogram dry weight) |
| TOC | | Total Organic Carbon (milligram/kilogram dry weight for sediment; milligrams/liter for rinse blanks) |
| Per_solids | | Percent solids (%) |
| Per_rec | | Laboratory and matrix spike percent recovery (%) |
| Surr_per_tetrachloro_m_xylene | | Percent surrogate recovery of tetrachloro-m-xylene (%) |
| Surr_per_decachlorobiphenyl | | Percent surrogate recovery of decachlorobiphenyl (%) |

***Comments:***

(1) -999 indicates parameter not measured

(2) * designates fields included within attribute table of shapefile

(3) Negative numbers (other than -999) indicate the concentration was below the detection limit (DL), i.e. -124 means the concentration was less than the DL of 124 milligrams per kilogram dry-weight

(4) Three grab samples (0 to 3 inches) were collected along each transect at a distance of either 1, 3, and 5 feet or 1, 5, and 10 feet from the beginning of upland vegetation depending on the transect. All grab samples collected along each transect were composited into one sample for laboratory analyses.

(5) Shapefile shows all points along a transect, including transect starting points at edge of water and/or edge of vegetation.

**Table 23**
**Data Dictionary for sediment_bz**

***Data Table Description:*** 1993 RSI Phase II, 1995 Pre- and Post-NTCRA, 1997-98 SRS, 2000-2001 SSS, 2001 Pre-Capping, and 2003 Phase I sediment data (BZ)

***Data Table Name:*** sediment_bz ***Related Shapefile:*** sediment_bz_locat.shp

Shapefile Location: \data\sed_qual Shapefile Source: Imported by hand at QEA

***Key Item:*** Key

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Key | * | Key identification for linking to Access database (Key = Sample_id, Start_dep, End_dep) |
| Year | * | Sample year |
| Month | * | Sample month |
| Day | * | Sample day |
| Survey | * | Name of survey (NTCRA = Non-Time-Critical Removal Action, RSI Phase II = River and Sediment Investigation Phase II, SRS = Supplemental Remedial Studies, SSS = Supplemental Sediment Sampling, Pre-Capping = prior to Capping Pilot Study, PhaseI = 2003 Phase I) |
| Lab | | Laboratory where samples were analyzed (ATC = Alcoa Technical Center, MSS = Mass Spec Services, NEA = Northeast Analytical, Inc., TBE = Teledyne-Brown Engineering) |
| Lab_id | | Laboratory identification number |
| Sample_id | * | Sample identification code |
| Dupe | | Indication of sample duplicate (DUP = yes, blank = no) |
| Type | * | Sample type (QA/QC = quality assurance/quality control, core, grab) |
| Rmile | | River mile estimated from confluence of Grasse and St. Lawrence Rivers |
| Northing | * | 1983 NY State Plane Northing (feet) |
| Easting | * | 1983 NY State Plane Easting (feet) |
| Loc_est | | Northing and Easting estimated (EST = estimated, REC = recorded) |

*(continued)*

**Table 23**
**Data Dictionary for sediment_bz**
**(continued)**

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Start_dep | * | Starting depth of sample |
| End_dep | * | Ending depth of sample |
| Dep_units | * | Units of depth of sample |
| TOC | | Total organic carbon (milligrams/kilogram dry weight) |
| B_dens | | Bulk density (grams/milliliter) |
| Per_moist | | Percent moisture (%) |
| Per_solids | | Percent solids (%) |
| BZ_corr | | BZ correlation applied? |
| BZ_1 *through* BZ_209 | | BZ_# concentration, where # = numbers 1 through 209 (milligrams/kilogram dry weight) |
| Tot_PCB_bz | | BZ total PCB concentration (milligrams/kilogram dry weight) |
| PCB_qual | | Data qualifier for total PCBs (U = below the MDL, J = estimated) |
| Mono *through* Nona | | #chlorinated biphenyl, where # = mono, di, tri, tetra, penta, hexa, hepta, octa, nona (weight percent) |
| Ortho | | Ortho-chlorines per biphenyl |
| Meta | | Meta-chlorines per biphenyl |
| Para | | Para-chlorines per biphenyl |
| Clbp | | Chlorines per biphenyl |
| Biphenyl | | Biphenyl concentration (milligram/kilogram dry weight) |
| Cs_137 | | Cesium-137 (picoCurie/gram dry weight) |
| Be_7 | | Berillium-7 (picoCurie/gram dry weight) |
| Pb_210 | | Lead-210 (picoCurie/gram dry weight for sediment; picoCurie/gram wet weight for water blanks) |
| Per_rec | | Laboratory spike percent recovery (%) |
| Description | | Sediment descriptions reported by field crew |

*(continued)*

**Table 23**
**Data Dictionary for sediment_bz**
**(continued)**

| *Field Name* | *GIS* | *Description* |
|---|---|---|
| Status | | Data usability (current = data reflects current sediment conditions, historic = data does not reflect current conditions, QAQC = quality assurance/quality control) |

***Comments:***

(1) -999 indicates parameter not measured

(2) * designates fields included within attribute table of shapefile

(3) Negative numbers (other than -999) indicate the concentration was below the method detection limit (MDL), i.e. -124 means the concentration was less than the MDL of 124 milligrams per kilogram dry-weight.

(4) PCB qualifiers were not able to be assigned to data collected prior to 2000 since PQL and MDL information were not available for those datasets.

**Table 24**
**Data Dictionary for sediment_char**

***Data Table Description:*** 2001, 2003/2004 and 2006 sediment physical characterization

***Data Table Name:*** sediment_char ***Related Shapefiles:*** sediment_char_locat.shp

Shapefiles Location: \data\sed_qual Shapefile Source: Imported by hand at QEA

***Key Item:*** Sample_id

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Year | * | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Survey | | Survey name (2001Probing = survey conducted in 2001, Pre-PhaseI = prior to 2003 Phase I, PhaseI = 2003 Phase I, PhaseII = 2003 Phase II, Jan2004 = January 2004, Focused = Focused Studies) |
| Lab | | Laboratory where samples were analyzed (CDM/NEA = Camp, Dresser & McKee, Inc. for grain size and Northeast Analytical, Inc. for % solids and bulk density) |
| Lab_id | | Laboratory identification number used by NEA |
| Sample_id | * | Sample identification code |
| Point_id | * | Sample identification code to link data with probing data in sed_probe |
| Dupe | | Indication of sample duplicate (DUP = yes, blank = no) |
| Type | | Sample type |
| Northing | * | 1983 NY State Plane Northing (feet) |
| Easting | * | 1983 NY State Plane Easting (feet) |
| Start_dep | | Starting depth of sample |
| End_dep | | Ending depth of sample |
| Dep_units | | Units of depth of measured sample |
| Per_solids | | Percent solids (%) |

*(continued)*

**Table 24**
**Data Dictionary for sediment_char**
**(continued)**

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| B_dens | | Bulk density (grams/milliliter) |
| Per_pass_75_mm | | Percent of sample passing 75 mm sieve (%) |
| Per_pass_19mm | | Percent of sample passing 19 mm sieve (%) |
| Per_pass_12pt5_mm | | Percent of sample passing 12.5 mm sieve (%) |
| Per_pass_9pt5_mm | | Percent of sample passing 9.5 mm sieve (%) |
| Per_pass_4pt75_mm | | Percent of sample passing 4.75 mm sieve (%) |
| Per_pass_2pt00mm | | Percent of sample passing 2.00 mm sieve (%) |
| Per_pass_0pt85_mm | | Percent of sample passing 0.85 mm sieve (%) |
| Per_pass_0pt425_mm | | Percent of sample passing 0.425 mm sieve (%) |
| Per_pass_0pt15_mm | | Percent of sample passing 0.15 mm sieve (%) |
| Per_pass_0pt075_mm | | Percent of sample passing 0.075 mm sieve (%) |
| Per_pass_0pt002_mm | | Percent of sample passing 0.002 mm – hydrometer (%) |
| Comments | | Notes reported by laboratory, identification of duplicate samples |
| Status | | Data usability (current = data reflects current sediment conditions, historic = data does not reflect current conditions) |

***Comments:***

(1) -999 indicates parameter not measured

(2) * designates fields included within attribute table of shapefile

(3) Sample id refers to original sample name (<Transect#>-A<ft_downstream>-<ft_from_north_shore>). The data sometimes may be referred to by the following equivalent ids:

| Original ID | Equivalent ID |
|---|---|
| T-25-A600 | T-26-A100 |
| T-25-A800 | T-26-A300 |
| T-27-A600 | T-28-A100 |
| T-27-A800 | T-28-A300 |
| T-29-A600 | T-30-A100 |
| T-29-A800 | T-30-A300 |

In other words, for example, 100 ft downstream of T-26 is the same as 600 ft downstream of T-25.

**Table 25**
**Data Dictionary for sediment_field**

***Data Table Description:*** 2003 Phase I, 2003/2004 Phase II, 2004 Focused, January 2004, 2006 Phase I, 2007 Phase II

***Data Table Name:*** sediment_field ***Related Shapefiles:*** sediment_field_locat.shp

Shapefiles Location: \data\sed_qual Shapefile Source: Imported by hand at QEA

***Key Item:*** Point_ID

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Survey | | Survey name (PhaseI = PhaseI, PhaseII = Phase II, Jan04 = January 2004, Focused = Focused, 2006PhaseI = 2006 Phase I, 2007Phase2 = 2007 Phase II) |
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Point_ID | | Sample identification code (matches with "location" in sediment_aro and sediment_char) |
| Transect | | Transect number |
| Northing | | 1983 NY State Plane Northing (feet) |
| Easting | | 1983 NY State Plane Easting (feet) |
| Water_elev | | Water elevation (feet) |
| Sed_elev | | Sediment elevation (feet) |
| Water_dep | | Depth of water (feet) |
| Sed_dep | | Sediment probing depth (feet) |
| Penet_ft | | Penetration depth (feet) |
| Recovery | | Sediment recovered during coring (feet) |
| HBEL_ft | | Hard bottom elevation based on probing depth (feet) |
| Type | | Sample collection technique (core = manual push cores, grab = surface (0-3 inches) sediment only) |
| Comments | | Notes reported by field crew |

*(continued)*

**Table 25**
**Data Dictionary for sediment_field**
**(continued)**

***Comments:***

(1) -999 indicates parameter not measured

(2) Water and sediment elevations based on USLS 35

**Table 26**
**Data Dictionary for spmd_bz**

***Data Table Description:*** 1995 Pre-/Post-NTCRA,1997-99 SRS, and 2001-02 SRS SPMD samples (BZ)

***Data Table Name:*** spmd_bz ***Related Shapefile:*** spmd_locat.shp

***Shapefile Location:*** *\data\water_qual* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Transect

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Survey | | Name of survey (Pre-/Post-NTCRA = Pre-/Post- Non-Time-Critical Removal Action, SRS = Supplemental Remedial Studies) |
| Lab | | Laboratory where sample was analyzed (ATC = Alcoa Technical Center) |
| Lab_id | | Laboratory identification number |
| Sample_id | | Sample identification code |
| Dupe | | Indication of sample duplicate (DUP = yes, blank = no) |
| Transect | * | Transect (DS-FAR/NEAR = downstream farshore/nearshore, US-FAR/NEAR = upstream farshore/nearshore) |
| Set | | Sampling set (Pre-Non-Time-Critical Removal Action, POST = Post-Non-Time-Critical Removal Action, RM = Routine Monitoring) |
| Rmile | | River mile estimated from confluence of Grasse and St. Lawrence Rivers |
| Wc_dep | | Water column depth (feet) |
| Sample_dep | | Sample depth (feet) |
| Year | | Sample year |
| Month_depl | | Month sample was deployed |
| Day_depl | | Day sample was deployed |
| Month_retr | | Month sample was retrieved |
| Day_retr | | Day sample was retrieved |
| Duration | | Number of days SPMDs remained in River |
| Calib_corr | | Calibration correction applied? |

*(continued)*

**Table 26**
**Data Dictionary for spmd_bz**
**(continued)**

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Bias_corr | | Bias correction applied? |
| BZ_corr | | BZ correction applied? |
| BZ_1 *through* BZ_209 | | BZ_# mass, where # = numbers 1 through 209 (nanograms/SPMD) |
| Tot_PCB_bz | | BZ total PCB mass (nanograms/SPMD) |
| Mono *through* Deca | | #chlorinated biphenyl, where # = mono, di, tri, tetra, penta, hexa, hepta, octa, nona, deca (weight percent) |
| Ortho | | Ortho-chlorines per biphenyl |
| Meta | | Meta-chlorines per biphenyl |
| Para | | Para-chlorines per biphenyl |
| Clbp | | Chlorines per biphenyl |
| Surr_spk | | Surrogate spike (nanograms) |
| Surr_rec | | Surrogate recovered (nanograms) |
| Surr_per | | Percent surrogate recovered (%) |

***Comments:***
(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile

**Table 27**
**Data Dictionary for spmd_peak**

***Data Table Description:*** 1996 SRS SPMD samples (peak)

***Data Table Name:*** spmd_peak ***Related Shapefile:*** spmd_locat.shp

***Shapefile Location:*** *\data\water_qual* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Transect

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Survey | | Survey name (SRS = Supplemental Remedial Studies) |
| Lab | | Laboratory where sample was analyzed (NEA = Northeast Analytical, Inc.) |
| Lab_id | | Laboratory identification number |
| Sample_id | | Sample identification code |
| Dupe | | Indication of sample duplicate (DUP = yes, blank = no) |
| Year | | Sample year |
| Transect | * | Transect number (DS-FAR/NEAR = downstream farshore/nearshore, US-FAR/NEAR =upstream farshore/nearshore) |
| Set | | Sampling set (RM = Routine Monitoring) |
| Rmile | | River mile estimated from confluence of Grasse and St. Lawrence Rivers |
| Wc_dep | | Water column depth (feet) |
| Sample_dep | | Depth of sample (feet) |
| Month_depl | | Month sample was deployed |
| Day_depl | | Day sample was deployed |
| Month_retr | | Month sample was retrieved |
| Day_retr | | Day sample was retrieved |
| Duration | | Number of days SPMDs remained in River |
| Calib_corr | | Calibration correction applied? |

*(continued)*

**Table 27**
**Data Dictionary for spmd_peak**
**(continued)**

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Bias_corr | | Bias correction applied? |
| BZ_corr | | BZ correction applied? |
| PK_1 *through* PK_118 | | PK_# mass, where # = numbers 1 through 118 (nanograms/SPMD) |
| Tot_PCB_peak | | Peak total PCB mass (nanograms/SPMD) |
| Mono *through* Deca | | #chlorinated biphenyl, where # = mono, di, tri, tetra, penta, hexa, hepta, octa, nona, deca (weight percent) |
| Ortho | | Ortho-chlorines per biphenyl |
| Meta_Para | | Sum of Meta-chlorines per biphenyl and Para-chlorines per biphenyl |
| Clbp | | Chlorines per biphenyl |

***Comments:***
(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile

**Table 28**
**Data Dictionary for water_aro**

***Data Table Description:*** 1995 during-NTCRA water data (Aroclor)

***Data Table Name:*** water_aro ***Related Shapefiles:*** water_NTCRA_locat.shp

***Shapefiles Location:*** *\data\water_qual* ***Shapefile Source:*** BBL

***Key Item:*** Location

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Survey | | Survey name (During-NTCRA = During-Non-Time-Critical Removal Action) |
| Lab | | Laboratory where samples were analyzed (Alcoa = Alcoa Technical Center.) |
| Type | | Sample type (TOTAL = total, unfiltered) |
| Description | | Sample description (DISC = Discrete |
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Hour | | Sample hour |
| Location | * | Sample collection location |
| TSS | | Total Suspended Solids (milligrams/liter) |
| Turb | | Turbidity (nephelometric turbidity units) |
| Tot_PCB_aro | | Aroclor total PCB concentration (nanograms/liter) |
| Comments | | Comments from field or laboratory |

***Comments:***
(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile
(3) Negative numbers (other than -999) indicate the concentration was below the detection limit (DL), i.e. -65 means the concentration was less than the DL of 65 nanograms per liter.
(4) All local water samples were collected at 0.8 times the total water depth.
(5) At WC006.5 on 8/16, turbidity was reported as 2-3 NTU; it is listed as 2.5 in the database.
At WC006.5 on 8/18, turbidity was reported as 3-4 NTU; it is listed as 3.5 in the database.

**Table 29**
**Data Dictionary for water_bz**

***Data Table Description:*** 1995 Pre-, During-, and Post- NTCRA and 1997 Supplemental Remedial Studies water column data (BZ)

***Data Table Name:*** water_bz ***Related Shapefile:*** water_locat.shp

***Shapefile Location:*** *\data\water_qual* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Transect

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Survey | | Survey name (Pre-NTCRA = Pre-Non-Time-Critical Removal Action, SRS = Supplemental Remedial Studies) |
| Lab | | Lab where sample was analyzed (ATC = Alcoa Technical Center) |
| Sample_id | | Sample identification number |
| Type | | Sample type (QAQC = quality assurance/quality control, DISS = dissolved, TOTAL = total, unfiltered) |
| Description | | Sample description (QAQC = quality assurance/quality control, COMP = composite) |
| Round | | Sampling round (PRE = Pre-Non-Time-Critical Removal Action, DURING = During-Non-Time-Critical Removal Action, POST = Post-Non-Time-Critical Removal Action, RM = Routine Monitoring, STORM = Storm Sampling) |
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Transect | * | Transect number |
| Rmile | | River mile estimated from confluence of Grasse and St. Lawrence Rivers |
| Temp | | Water temperature (degrees Celsius) |
| Turb | | Turbidity (nephelometric turbidity units) |
| PH | | pH (standard units) |
| Cond | | Specific conductivity (milliSiemens/centimeter) |

*(continued)*

**Table 29**
**Data Dictionary for water_bz**
**(continued)**

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| TSS | | Total Suspended Solids (milligrams/liter) |
| TOC | | Total Organic Carbon (milligrams/liter) |
| DOC | | Dissolved Organic Carbon (milligrams/liter) |
| POC | | Particulate Organic Carbon (milligrams/liter) |
| Chl_a | | Chlorophyll a (micrograms/liter) |
| DO | | Dissolved Oxygen (milligrams/liter) |
| BZ_corr | | BZ correction applied? |
| BZ_1 *through* BZ_209 | | BZ_# concentration, where # = numbers 1 through 209 (nanograms/liter) |
| Tot_PCB_bz | | BZ total PCB concentration (nanograms/liter) |
| Mono *through* Deca | | #chlorinated biphenyl, where # = mono, di, tri, tetra, penta, hexa, hepta, octa, nona, and deca (weight percent) |
| Ortho | | Ortho-chlorines per biphenyl |
| Meta | | Meta-chlorines per biphenyl |
| Para | | Para-chlorines per biphenyl |
| Clbp | | Chlorines per biphenyl |

***Comments:***
(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile

**Table 30**
**Data Dictionary for water_field**

***Data Table Description:*** 1997-2008 Field Water Quality Measurements

***Data Table Name:*** water_field ***Related Shapefile:*** water_locat.shp

***Shapefile Location:*** *\data\water_qual* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Transect

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Start_hour | | Hour sampling started |
| End_hour | | Hour sampling ended (applicable only to composited samples collected during solids monitoring) |
| Survey | | Survey name (FLOAT = Float Survey, SRS = Supplemental Remedial Studies, Focused = Focused Study - TSS During Spring High Flow/Ice Breakup) |
| Type | | Sample type (COMP = composite, DISC = discrete, FIELD = field) |
| Round | | Sampling round (FLOAT = Float Survey, RM = Routine Monitoring, STORM = Storm sampling, INT = Intensive Survey, TSS = Solids Monitoring) |
| Transect | * | Transect number |
| Rmile | | River mile estimated from confluence of Grasse and St. Lawrence Rivers |
| Wc_dep | | Depth of water (feet) |
| Sample_dep | | Depth of sample (feet) |
| Temp | | Temperature (degrees Celsius) |
| PH | | pH (standard units) |
| Cond | | Specific conductivity (milliSiemens/centimeter) |

*(continued)*

**Table 30**
**Data Dictionary for water_field**
**(continued)**

| *Field Name* | *GIS* | *Description* |
|---|---|---|
| Turb | | Turbidity (nephelometric turbidity units) |
| DO | | Dissolved Oxygen (milligrams/liter) |
| TSS | | Total Suspended Solids (milligrams/liter) |

***Comments:***

(1) -999 indicates parameter not measured

(2) * designates fields included within attribute table of shapefile

(3) Descriptions of transects are as follows:

| **Transect** | **Description** |
|---|---|
| WC-<transect #> | Water column sampling transect (with designation of 0.2 or 0.8 times water depth if applicable) |
| <transect #>M | Sediment probing transect - middle (1/2 of river width from north shore) |
| <transect #>N | Sediment probing transect - north (1/4 of river width from north shore) |
| <transect #>S | Sediment probing transect - south (3/4 of river width from north shore) |

(4) During some SRS rounds in 2001 and all rounds in 2002 and 2003, field data were collected at water column Transect WC001 instead of water column Transect WCMSB due to safety issues.

(5) During Round 6 through 15 in 2004, field data and water samples were collected at WC001 instead of WCMSB, due to construction at WCMSB.

(6) During SRS rounds in 2005, field data were collected at WC001 during velocity measurements instead of at WCMSB.

**Table 31**
**Data Dictionary for water_iupac**

***Data Table Description:*** 1998-2008 SRS water column samples (IUPAC)

***Data Table Name:*** water_iupac ***Related Shapefile:*** water_locat.shp

***Shapefile Location:*** *\data\water_qual* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Transect

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Hour | | Sample hour |
| Survey | | Survey name (FLOAT = Float Survey, SRS = Supplemental Remedial Studies) |
| Lab | | Laboratory where sample was analyzed (NEA = Northeast Analytical, Inc.) |
| Lab_id | | Laboratory identification code |
| Sample_id | | Sample identification code |
| Type | | Sample type (QAQC = quality assurance/quality control, TOTAL = total, unfiltered) |
| Description | | Sample description (COMP = composite, DISC = Discrete, QAQC = quality assurance/quality control) |
| Round | | Sampling round (FLOAT = Float Survey, RM = Routine Monitoring, STORM = Storm Sampling, INT = Intensive Survey) |
| Transect | * | Transect number |
| Rmile | | River mile estimated from confluence of Grasse and St. Lawrence Rivers |
| Wc_depth | | Water column depth (feet) |
| Sample_dep | | Sample depth (feet) |
| Temp | | Water temperature (degrees Celsius) |
| PH | | PH (standard units) |
| Cond | | Specific conductivity (milliSiemens/centimeter) |

*(continued)*

**Table 31**
**Data Dictionary for water_iupac**
**(continued)**

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Turb | | Turbidity (nephelometric turbidity units) |
| Dox | | Dissolved Oxygen (milligrams/liter) |
| POC | | Particulate Organic Carbon (milligrams/liter) |
| TSS | | Total Suspended Solids (milligrams/liter) |
| Iupac_1 *through* Iupac_209 | | Iupac_# concentration, where # = numbers 1 through 209 (nanograms/liter) |
| Tot_PCB_iupac | | Iupac total PCB concentration (nanograms/liter) |
| Mono *through* Deca | | #chlorinated biphenyl, where # = mono, di, tri, tetra, penta, hexa, hepta, octa, nona, and deca (weight percent) |
| Ortho | | Ortho-chlorines per biphenyl |
| Meta | | Meta-chlorines per biphenyl |
| Para | | Para-chlorines per biphenyl |
| Clbp | | Chlorines per biphenyl |
| Surr_per | | Percent surrogate recovered (%) |
| Per_recov | | Percent recovered (%) |

***Comments:***
(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile
(3) Descriptions of transects are as follows:

| **Transect** | **Description** |
|---|---|
| WC-<transect #> | Water column sampling transect (with designation of 0.2 or 0.8 times water depth if applicable) |
| <transect #>M | Sediment probing transect - middle (1/2 of river width from north shore) |
| <transect #>N | Sediment probing transect - north (1/4 of river width from north shore) |
| <transect #>S | Sediment probing transect - south (3/4 of river width from north shore) |

*(continued)*

**Table 31**
**Data Dictionary for water_iupac**
**(continued)**

(4) Float survey samples from 2001 are depth integrated composites.
(5) During 2001, field data were collected at water column Transect WC001 and PCB samples were collected at water column Transect WCMSB during most odd numbered sampling round due to safety issues. The field data listed with the MSB sample are those from water column Transect WC001.
(6) During 2002 and 2003, field data were collected at water column Transect WC001 instead of water column Transect WCMSB due to safety issues.
(7) During Round 6 through 15 in 2004, field data and water samples were collected at WC001 instead of WCMSB, due to construction at WCMSB.
(8) During 2005, field data were collected at WC001 during velocity measurements instead of at WCMSB.

**Table 32**
**Data Dictionary for water_peak**

***Data Table Description:*** 1996 SRS Water Column Samples (peak)

***Data Table Name:*** water_peak ***Related Shapefile:*** water_locat.shp

***Shapefile Location:*** *\data\water_qual* ***Shapefile Source:*** Imported by hand at QEA

***Key Item:*** Transect

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| Survey | | Survey name (SRS = Supplemental Remedial Studies) |
| Lab | | Laboratory where sample was analyzed (NEA = Northeast Analytical Inc.) |
| Lab_id | | Laboratory identification code |
| Sample_id | | Sample identification code |
| Dupe | | Is there a duplicate sample? (DUP = yes, blank = no) |
| Type | | Sample type (QAQC = quality assurance/quality control, DISS = dissolved, TOTAL = total, unfiltered) |
| Description | | Sample type (QAQC = quality assurance/quality control, COMP = composite, DISC = discrete) |
| Round | | Sample round (STORM = Storm Sampling, RM = Routine Monitoring) |
| Year | | Sample year |
| Month | | Sample month |
| Day | | Sample day |
| Transect | * | Transect number |
| Rmile | | River mile estimated from confluence of Grasse and St. Lawrence Rivers |
| Temp | | Water temperature (degrees Celsius) |
| Turb | | Turbidity (nephelometric turbidity units) |
| PH | | pH (standard units) |
| Cond | | Specific conductivity (milliSiemens/centimeter) |

*(continued)*

**Table 32**
**Data Dictionary for water_peak**
**(continued)**

| ***Field Name*** | ***GIS*** | ***Description*** |
|---|---|---|
| TSS | | Total Suspended Solids (milligrams/liter) |
| VSS | | Volatile Suspended Solids (milligrams/liter) |
| TOC | | Total Organic Carbon (milligrams/liter) |
| DOC | | Dissolved Organic Carbon (milligrams/liter) |
| POC | | Particulate Organic Carbon (milligrams/liter) |
| Chl_a | | Chlorophyll a (micrograms/liter) |
| Calib_corr | | Calibration correction applied? |
| Bias_corr | | Bias correction applied? |
| BZ_corr | | BZ correction applied? |
| PK_1 *through* PK_118 | | PK_# concentration, where # = numbers 1 through 118 (nanograms/liter) |
| Tot_PCB_pk | | Peak total PCB concentration (nanograms/liter) |
| Mono *through* Deca | | #chlorinated biphenyl where # = mono, di, tri, tetra, penta, hexa, hepta, octa, nona, deca (weight percent) |
| Ortho | | Ortho-chlorines per biphenyl |
| Meta_Para | | Meta-chlorines per biphenyl and Para-chlorines per biphenyl |
| Clbp | | Chlorines per biphenyl |

***Comments:***
(1) -999 indicates parameter not measured
(2) * designates fields included within attribute table of shapefile

# Environmental Database

*Remedial Options Pilot Study*

This appendix contains the Environmental Database for the Remedial Options Pilot Study (ROPS). This database is provided electronically on the enclosed CD. A data dictionary is also included to facilitate use of the database.

**Data Dictionary for ROPS Environmental Database**

*Grasse River Study Area*
**Massena, New York**

**Table 1**
**Data Dictionary for air_field_PM10_ROPS**

***Data Table Description:*** 2005 ROPS air particulate matter less than or equal to 10 microns in diameter ($PM_{10}$) data as measured in the field using a DustTrak meter

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | ROPS survey (pre-ROPS = prior to ROPS construction, during-ROPS = during ROPS construction) |
| Location | Sampling location (AIR1, AIR2, AIR3, AIR4, AIR5, AIR6, AIRSLF) |
| Start_date | Starting date for 15-minute monitoring period |
| Start_time | Starting time for 15-minute monitoring period (HH:MM:SS) |
| PM10 | 15-minute running average concentration of particulate matter less than or equal to 10 microns in diameter (milligrams per cubic meter) |

**Table 2**
**Data Dictionary for air_field_VOC_ROPS**

***Data Table Description:*** 2005 ROPS air volatile organic compound (VOC) data as measured in the field using a photoionization detector (PID) meter

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | ROPS survey (pre-ROPS = prior to ROPS construction, during-ROPS = during ROPS construction) |
| Location | Sampling location (AIR1, AIR2, AIR3, AIR4, AIR5, AIR6) |
| Start_date | Starting date for 5-minute monitoring period |
| Start_time | Starting time for 5-minute monitoring period (HH:MM) |
| MinVOC | Minimum total VOC measured during 5-minute interval (parts per million) |
| AvgVOC | 5-minute running average concentration of total VOCs (parts per million) |
| MaxVOC | Maximum total VOC measured during 5-minute interval (parts per million) |

**Table 3**
**Data Dictionary for air_field_wind_ROPS**

***Data Table Description:*** Wind data during times of 2005 ROPS air sampling

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | ROPS survey (pre-ROPS = prior to ROPS construction, during-ROPS = during ROPS construction) |
| Start_date | Starting date for monitoring period |
| End_date | Ending date for monitoring period |
| Wind_speed | Average wind speed (miles per hour) |
| Direction | Prevailing wind direction (from North) |
| Bckgrd_loc | Location of background station, as indicated by prevailing wind direction (AIR1, AIR2, AIR3, AIR4, AIR5, AIR6, AIRSLF) |
| Notes | Additional notes reported by the field crew |

***Comments:***

(1) Average wind speed and prevailing wind direction were estimated from data obtained from the National Weather Service weather station at the Massena International Airport – Richards Field (Station ID: KMSS), located approximately 1 mile (as the crow flies) from the site.

(2) Prior to 10/26/05, background locations were determined considering the river as the central location. From 10/26/06 and later, background locations were determined considering the secure landfill as the central location.

(3) During some days, the wind direction was reported to be fluctuating or coming from two different directions. In those cases, the direction includes all directions reported and the background location was determined for each reported direction.

**Table 4**
**Data Dictionary for air_lab_PAH_ROPS**

***Data Table Description:*** 2005 ROPS data for air samples collected over a 24-hour period and analyzed in the laboratory for polycyclic aromatic hydrocarbons (PAHs)

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | ROPS survey (pre-ROPS = prior to ROPS construction, during-ROPS = during ROPS construction) |
| Lab | Laboratory where samples were analyzed (Con-Test = Con-Test Analytical Laboratories) |
| Lab_ID | Laboratory identification number |
| Sample_ID | Sample identification code |
| Type | Sample type (sample = field sample, QAQC = quality assurance/quality control) |
| Location | Location of sampling station (AIR1, AIR2, AIR3, AIR4, AIR5, AIR6) |
| Retr_month | Sample retrieval month |
| Retr_day | Sample retrieval day |
| Retr_year | Sample retrieval year |
| Acenaphthene_*through* Pyrene | Amount and concentration of individual PAH (microgram and microgram per cubic meter) |
| Air_vol | Volume of air sampled (liter) |
| Nitrobenzene-d5_perrec *through* Benzo(a)pyrene-7,8-d12 | Percent recovery of surrogates (%) |
| Naphthalene_perrec *through* Perylene_perrec | Percent recovery of individual PAH (%) |
| Qual_indeno(1,2,3-cd)pyrene | Data qualifier for indeno(1,2,3-cd)pyrene (J = estimated) |

***Comments:***

(1) -999 indicates parameter not measured/not reported by laboratory

(2) Negative numbers (other than -999) indicate the concentration was below the reporting limit (RL), i.e. -0.1 means the concentration was less than the RL of 0.1 micrograms

**Table 5**
**Data Dictionary for air_lab_PCB_ROPS**

***Data Table Description:*** 2005 ROPS data for air samples collected over a 24-hour period and analyzed in the laboratory for polychlorinated biphenyls (PCBs [Aroclor])

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | ROPS survey (pre-ROPS = prior to ROPS construction, during-ROPS = during ROPS construction) |
| Lab | Laboratory where samples were analyzed (Con-Test = Con-Test Analytical Laboratories) |
| Lab_ID | Laboratory identification number |
| Sample_ID | Sample identification code |
| Type | Sample type (sample = field sample, dup = field duplicate, QAQC = quality assurance/quality control) |
| Location | Location of sampling station (AIR1, AIR2, AIR3, AIR4, AIR5, AIR6) |
| Retr_month | Sample retrieval month |
| Retr_day | Sample retrieval day |
| Retr_year | Sample retrieval year |
| A_1016 *through* A_1260 | Aroclor_# amount and concentration, where # = 1016, 1221, 1232, 1242, 1248, 1254, 1260 (microgram and micrograms/cubic meter) |
| Air_vol_L | Volume of air sampled (liter) |
| Total_PCBs | Total PCB concentration (micrograms per cubic meter) |
| Deca_perrec | Percent recovery of decachlorobiphenyl (%) |
| Tetra_perrec | Percent recovery of tetrachloro-m-xylene (%) |
| A1232_perrec *through* A1254_perrec | A# percent recovery, where # = 1232, 1242, 1248, 1254 (%) |
| Qual_A1232 *through* Qual_A1248 | Data qualifiers for Aroclors 1232, 1242, and 1248 (J = estimated) |

***Comments:***
(1) -999 indicates parameter not measured/not reported by laboratory
(2) Negative numbers (other than -999) indicate the concentration was below the reporting limit (RL), i.e. -0.1 means the concentration was less than the RL of 0.1 micrograms

**Table 6**
**Data Dictionary for air_lab_PM10_ROPS**

***Data Table Description:*** 2005 ROPS data for air samples collected over a 24-hour period and analyzed in the laboratory for particulate matter less than or equal to 10 microns in diameter ($PM_{10}$)

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | ROPS survey (pre-ROPS = prior to ROPS construction, during-ROPS = during ROPS construction) |
| Lab | Laboratory where samples were analyzed (Con-Test = Con-Test Analytical Laboratories) |
| Lab_ID | Laboratory identification number |
| Sample_ID | Sample identification code |
| Type | Sample type (sample = field sample) |
| Location | Location of sampling station (AIR1, AIR2, AIR3, AIR4, AIR5, AIR6) |
| Retr_month | Sample retrieval month |
| Retr_day | Sample retrieval day |
| Retr_year | Sample retrieval year |
| PM10_mg | Mass of $PM_{10}$ (milligram) |
| PM10_mgm3 | Concentration of $PM_{10}$ (milligram per cubic meter) |
| Air_vol | Volume of air sampled (liter) |

**Table 7**
**Data Dictionary for air_lab_VOC_ROPS**

***Data Table Description:*** 2005 ROPS data for air samples collected over a 24-hour period and analyzed in the laboratory for volatile organic compounds (VOCs)

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | ROPS survey (pre-ROPS = prior to ROPS construction, during-ROPS = during ROPS construction) |
| Lab | Laboratory where samples were analyzed (Con-Test = Con-Test Analytical Laboratories) |
| Lab_ID | Laboratory identification number |
| Sample_ID | Sample identification code |
| Type | Sample type (sample = field sample, QAQC = quality assurance/quality control) |
| Location | Location of sampling station (AIR1, AIR2, AIR3, AIR4, AIR5, AIR6) |
| Retr_month | Sample retrieval month |
| Retr_day | Sample retrieval day |
| Retr_year | Sample retrieval year |
| Acetone_ppbV_*through* o-Xylene_ppbV | Concentration of individual VOC by volume (parts per billion by volume) |
| Acetone_ugm3 *through* o-Xylene_ugm3 | Concentration of individual VOC (microgram per cubic meter) |
| 4-Bromofluorobenzene_perrec | Percent recovery of surrogate 4-Bromofluorobenzene (%) |
| Acetone_perrec through o-Xylene_perrec | Percent recovery of individual VOC (%) |
| Qual_acetone *through* Qual_1,2,4-trichlorobenzene | Data qualifiers for acetone, 4-methyl-pentanone, MBTE, hexachlorobutadiene, 1,2,4-trichlorobenzene (J = estimated) |

***Comments:***
(1) -999 indicates parameter not measured/not reported by laboratory
(2) Negative numbers (other than -999) indicate the concentration was below the reporting limit (RL), i.e. -0.5 ppbV means the concentration was less than the RL of 0.5 ppbV

**Table 8**
**Data Dictionary for benthic_comm_ROPS**

***Data Table Description:*** Benthic community data from near the proposed location for an ice control structure (ICS) and from near shore areas during 2004 pre-ROPS and 2006_post-ROPS.

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey period (pre-ROPS = prior to ROPS construction) |
| Lab | Laboratories where samples were analyzed (CDM = Camp Dresser & McKee Soils Laboratory (grain size); Chadwick = Chadwick & Associates. (benthic); NEA = Northeast Analytical, Inc. (TOC)) |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Sampling_Area | General area of sampling (near ICS, near shore) |
| Sample_Method | Sampling method (net = sweep net in vegetated shoreline areas, ponar = petite ponar grab in the river channel) |
| Sample_ID | Location where sample was collected (US* = upstream of proposed ICS; DS* = downstream of proposed ICS; CON* = control station near Madrid, NY; *N = north (1/4 the distance across river from the northern shoreline); *C = center (1/2 the distance across river); *S = south (1/4 the distance across river from southern shoreline); *NS* = near shore; *NB* = northern bank/shoreline; *SB* = southern bank/shoreline) |
| Wc_dep | Total depth of water column (feet) |
| pH | pH (standard units) |
| Cond | Specific conductivity (milliSiemens/centimeter) |
| Turb | Turbidity (nephelometric turbidity units) |
| DO | Dissolved oxygen (milligrams/liter) |
| Temp | Temperature (degrees Celsius) |
| Secchi_dep | Water clarity depth (feet) |

*(continued)*

**Table 8**
**Data Dictionary for benthic_comm_ROPS**
**(continued)**

| ***Field Name*** | ***Description*** |
|---|---|
| Velocity | Water velocity (feet per second) |
| Gravel_coarse | Coarse gravel composition (% by mass) |
| Gravel_fine | Fine gravel composition (% by mass) |
| Sand_coarse | Coarse sand composition (% by mass) |
| Sand_medium | Medium sand composition (% by mass) |
| Sand_fine | Fine sand composition (% by mass) |
| Silt | Silt composition (% by mass) |
| Clay | Clay composition (% by mass) |
| TOC | Total organic carbon (%) |
| Caenis amica *through* Sphaerium sp. | Number of species identified |
| Tot_indiv | Total number of individuals identified |
| Tot_taxa | Total number of taxa identified |

***Comments:***
(1) -999 indicates parameter not measured.
(2) See Figure 3-10 for sampling locations.
(3) The proposed ice control structure site was to be located approximately 0.5 miles upstream of the Route 37 Bridge. However, due to community concerns related to the proposed location of the structure, the ICS was not installed as planned as part of the ROPS.
(4) Water quality data were taken within one foot of substrate.

**Table 9**
**Data Dictionary for cap_material_ROPS**

***Data Table Description:*** Laboratory analyses of cap material prior to placement in the river during the 2005 ROPS

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | ROPS survey (during-ROPS = during ROPS construction) |
| Lab | Laboratories where samples were analyzed (CDM = Camp Dresser & McKee Soils Laboratory (grain size); NEA = Northeast Analytical, Inc. (TOC and % solids)) |
| Lab_ID | Identification number assigned by the laboratory (NEA) |
| Sample_ID | Sample identification code |
| Year | Sample collection year |
| Month | Sample collection month |
| Day | Sample collection day |
| Hour | Sample collection hour |
| TOC | Total organic carbon (milligram/kilogram dry weight) |
| Per_solids | Percent solids (%) |
| Per_pass_19mm | Percent of sample passing 19 mm sieve (%) |
| Per_pass_4pt75_mm | Percent of sample passing 4.75 mm sieve (%) |
| Per_pass_2pt00_mm | Percent of sample passing 2 mm sieve (%) |
| Per_pass_0pt425_mm | Percent of sample passing 0.425 mm sieve (%) |
| Per_pass_0pt075_mm | Percent of sample passing 0.075 mm sieve (%) |
| Per_pass_0pt002_mm | Percent of sample passing 0.002 mm sieve (%) |
| D50 | Median particle size (millimeters) |

**Table 10**
**Data Dictionary for ChaseMills_ROPS**

***Data Table Description:*** 2004-2007 river flow data from the USGS station on the Grasse River at Chase Mills (gage #04265432)

| ***Field Name*** | ***Description*** |
|---|---|
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Minute | Sample minute |
| Gage_height | Stage height at Chase Mills (feet) |
| Flow | River flow (cubic feet per second) |

***Comments:***
(1) -999 indicates no measurement available due to the presence of ice on the river

**Table 11**
**Data Dictionary for dredge_material_ROPS**

***Data Table Description:*** 2005 ROPS ex-situ dredge material data during ROPS construction

| ***Field Name*** | ***Description*** |
|---|---|
| Lab | Laboratories where samples were analyzed (CDM = Camp Dresser & McKee Soils Laboratory (grain size); ChemLab = Aloca Massena ChemLab (PCBs); NEA = Northeast Analytical, Inc. (TOC and % solids)) |
| Lab_ID1 | Identification number assigned by the laboratory (ChemLab = Alcoa Massena ChemLab – analysis for PCBs and % Moisture) |
| Lab_ID2 | Identification number assigned by the laboratory (Northeast Analytical, Inc. – analysis for % Solids & TOC) |
| Sample_ID | Sample identification code |
| QC_type | Sample type (sample= field sample, ms=matrix spike, sd=matrix spike duplicate, blk=laboratory blank, lcs*=laboratory control spike) |
| Sample_type | Type of stockpile sample (sand or filter cake) |
| Collection_ date | Sample collection date and time |
| A_1016 *through* A_1260 | Aroclor_# concentration, where # = 1016, 1221, 1232, 1242, 1248, 1254, 1260 (milligram/kilogram dry weight) |
| Decachlorobip henyl | Decachlorobiphenyl concentration (milligrams/kilogram dry weight) |
| Moisture | Percent moisture (%) |
| Tetracholor-m-xylene | Tetrachloro-meta-xylene concentration (milligrams/kilogram dry weight) |
| Total_PCB | Aroclor total PCB concentration (milligram/kilogram dry weight) |
| TOC | Total organic carbon (milligram/kilogram dry weight) |
| Per_solids | Percent solids (%) |
| Per_pass_75m m | Percent of sample passing 75 mm sieve (%) |
| Per_pass_19m m | Percent of sample passing 19 mm sieve (%) |
| Per_pass_4pt7 5_mm | Percent of sample passing 4.75 mm sieve (%) |
| Per_pass_2pt0 0_mm | Percent of sample passing 2 mm sieve (%) |

*(continued)*

**Table 11**
**Data Dictionary for dredge_material_ROPS**
**(continued)**

| | |
|---|---|
| Per_pass_0pt425_mm | Percent of sample passing 0.425 mm sieve (%) |
| Per_pass_0pt075_mm | Percent of sample passing 0.075 mm sieve (%) |
| Per_pass_0pt002_mm | Percent of sample passing 0.002 mm sieve (%) |
| D50 | Median particle size (millimeters) |
| Perrec_# | Percent recovery of Aroclor_# , where # = 1016, 1221, 1232, 1242, 1248, 1254, 1260 (%) |
| Perrec_decachlorobiphenyl | Percent recovery of decachlorobiphenyl (%) |
| Perrec_tetrachloro-m-xylene | Percent recovery of tetrachloro-m-xylene (%) |
| Qualifier_A1248 | Data qualifier for Aroclor 1248 (J = estimated) |

***Comments:***
(1) -999 indicates parameter not measured
(2) Negative numbers (other than -999) indicate the concentration was below the detection limit (DL), i.e. -1100 means the concentration was less than the DL of 1100 milligrams per kilogram)

**Table 12**
**Data Dictionary for fish_comm_ROPS**

***Data Table Description:*** Fish community data from near the proposed location for an ice control structure.

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey period (pre-ROPS = prior to ROPS construction) |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Sample_Method | Sampling method (electrofish = electrofishing unit used in near shore areas, net = gill net used in mid-river channel areas, trap = minnow trap used in mid-river channel areas) |
| Sampling_Area | Location where sample was collected (Upstream = upstream of proposed ICS; Downstream = downstream of proposed ICS; Control = upstream control location near Madrid, NY) |
| American eel *through* Yellow perch | Number of species identified |
| Tot_indiv | Total number of individuals identified |

***Comments:***

(1) See 2004 ROPS Baseline Report for sampling locations.

(2) The proposed ice control structure site was to be located approximately 0.5 miles upstream of the Route 37 Bridge. However, due to community concerns related to the proposed siting of the structure, the ICS was not installed as planned as part of the ROPS.

**Table 13**
**Data Dictionary for resfish_aro ROPS**

***Data Table Description:*** 1991 RSI Phase I, 1993 RSI Phase II, 1995 Post-NTCRA, 1996-2007 TMS, and 1998-1999 YOY resident fish data (Aroclor)

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey name (RSI Phase I and Phase II = River and Sediment Investigation Phase I and II, Post-NTCRA = Post-Non-Time-Critical Removal Action, TMS = Trend Monitoring Survey, YOY = Young-of-the-Year Monitoring Program) |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Lab_id | Laboratory identification code |
| Sample_id | Sample identification code ("_YOY" indicates young-of-year fish) |
| Lab | Lab where samples were analyzed (EEASC = Ecology and Environment Analytical Services Center, EnChem, HES = Hazelton Environmental Services, NEA = Northeast Analytical, Inc.) |
| Species | Species being analyzed (BBUL = Brown Bullhead, PKSD = Pumpkinseed, SHIN = Spottail Shiner, SMBS = Smallmouth Bass ) |
| Tissue | Fish portion being analyzed (CARC = carcass, FILL = fillet, VISC = viscera, WHOL = whole fish) |
| Location | Location (BACK = Background, DS-ENA = Further downstream of Outfall 001, ENA = Downstream of Outfall 001, GR_UT = Unnamed Tributary, LOWR = Lower Stretch, MIDL = Middle Stretch, MOUTH = River Mouth for spottail shiner or Mouth Stretch for smallmouth bass and brown bullhead, OF001 = Near Outfall 001, PC = Power Canal, UPPR = Upper Stretch, RCH# = Reach Number) |
| Northing | Estimated 1983 NY State Plane Northing (feet) |
| Easting | Estimated 1983 NY State Plane Easting (feet) |
| No_fish | Number of fish in composite |
| Min_length | Minimum length of fish (centimeters; applies to composite samples only) |
| Max_length | Maximum length of fish (centimeters; applies to composite samples only) |

*(continued)*

**Table 13**
**Data Dictionary for resfish_aro ROPS**
**(continued)**

| ***Field Name*** | ***Description*** |
|---|---|
| Length | Length of fish (centimeters) |
| Tiss_weight | Weight of tissue analyzed (grams) |
| Tot_weight | Total weight of fish (grams) |
| Per_lip | Percent lipids (%) |
| Calib_corr | Calibration correction applied? |
| Bias_corr | Bias correction applied? |
| BZ_corr | BZ correction applied? |
| A_1016 *through* A_ 1260 | Aroclor_# concentration, where # = 1016, 1221, 1232, 1242, 1248, 1254, 1260 (milligrams/kilogram wet weight) |
| Tot_PCB_aro | Aroclor total PCB concentration (milligrams/kilogram wet weight) |
| Col_type | Column type used for analysis (DB1_cap = capillary, PCK_col = packed column) |
| Per_rec | Laboratory spike percent recovery (%) |

***Comments:***

(1) -999 indicates parameter not measured

(2) Negative numbers (other than -999) indicate the concentration was below the detection limit (DL), i.e. -124 means the concentration was less than the DL of 124 milligrams per kilogram wet-weight

**Table 14**
**Data Dictionary for sed_aro_ROPS**

***Data Table Description:*** 2003 PhaseII, January 2004, 2004 pre-ROPS, 2005 during-ROPS, and 2005-2007 post-ROPS sediment core data (Aroclor)

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey name (PhaseII = Phase II, Jan2004 = January 2004, pre-/during-/post-ROPS = prior to/during/after ROPS construction) |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Lab | Laboratory where samples were analyzed (MSS = Mass Spec Services (Cesium-137), NEA = Northeast Analytical, Inc. (Aroclor)) |
| Lab_id | Laboratory identification number |
| Sample_id | Sample identification code |
| Type | Sample type (core, grab, or qaqc = quality assurance/quality control) |
| Rmile | River mile estimated from confluence of Grasse and St. Lawrence Rivers |
| Northing | 1983 NY State Plane Northing (feet) |
| Easting | 1983 NY State Plane Easting (feet) |
| Start_dep | Starting depth of sample |
| End_dep | Ending depth of sample |
| Dep_units | Units of depth of measured sample |
| A_1016 *through* A_1260 | Aroclor_# concentration, where # = 1016, 1221, 1232, 1242, 1248, 1254, 1260 (milligrams/kilogram dry weight) |
| Tot_PCB_aro | Aroclor total PCB concentration (milligrams/kilogram dry weight) |
| TOC | Total organic carbon (milligram/kilogram dry weight) |
| Soil_type | Physical description of sediment sample |
| Per_solids | Percent solids (%) |

*(continued)*

**Table 14**
**Data Dictionary for sed_aro_ROPS**
**(continued)**

| ***Field Name*** | ***Description*** |
|---|---|
| Cs_137 | Cesium-137 (picoCurie/gram dry weight) |
| B_dens | Bulk density (grams/milliliter) |
| Per_moist | Percent moisture (%) |
| Location | Location of sample collection |
| DUP | Indication of whether sample is a field duplicate or not (DUP = yes, blank = no) |
| Per_rec | Laboratory spike percent recovery (%) |
| Hour | Time of sample collection |
| QUAL_PCB | Data qualifier (J = estimated) |
| Tetrachlor | Tetrachloro-meta-xylene concentration (milligrams/kilogram dry weight) |

***Comments:***

(1) -999 indicates parameter not measured

(2) Negative numbers (other than -999) indicate the concentration was below the detection limit (DL), i.e. -124 means the concentration was less than the DL of 124 milligrams per kilogram dry-weight

(3) Only samples from 2003 Phase II and January 2004 within the ROPS area are included.

(4) See Appendix B for photographs and physical descriptions of cores collected prior to and during ROPS construction.

**Table 15**
**Data Dictionary for sed_char_ROPS**

***Data Table Description:*** 2003 PhaseII, January 2004, 2004 pre-ROPS, 2005 during-ROPS, and 2005-2007 post-ROPS sediment physical characterization data

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey name (PhaseII = Phase II, Jan2004 = January 2004, pre-/during-/post-ROPS = prior to/during/after ROPS construction) |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Lab | Laboratory where samples were analyzed (CDM = Camp, Dresser & McKee, Inc. for grain size) |
| Sample_ID | Sample identification code (cores & grabs) |
| Start_dep | Starting depth of sample |
| End_dep | Ending depth of sample |
| Units | Units of depth of measured sample |
| Per_pass_75mm | Percent of sample passing 75 mm sieve (%) |
| Per_pass_19mm | Percent of sample passing 19 mm sieve (%) |
| Per_pass_4pt75_mm | Percent of sample passing 4.75 mm sieve (%) |
| Per_pass_2pt00_mm | Percent of sample passing 2 mm sieve (%) |
| Per_pass_0pt85_mm | Percent of sample passing 0.85 mm sieve (%) |
| Per_pass_0pt425_mm | Percent of sample passing 0.425 mm sieve (%) |
| Per_pass_0pt15_mm | Percent of sample passing 0.15 mm sieve (%) |
| Per_pass_0pt075_mm | Percent of sample passing 0.075 mm sieve (%) |
| Per_pass_0pt002_mm | Percent of sample passing 0.002 mm sieve (%) |
| Location | Location of sample collection |
| DUP | Indication of whether sample is a field duplicate or not (DUP = yes, blank = no) |

*(continued)*

**Table 15**
**Data Dictionary for sed_char_ROPS**
**(continued)**

| ***Field Name*** | ***Description*** |
|---|---|
| D50 | Median particle size (millimeters) |
| Comments | Laboratory notes |

***Comments:***
(1) -999 indicates parameter not measured
(2) Only samples from 2003 Phase II and January 2004 within the ROPS area are included.

**Table 16**
**Data Dictionary for sed_field_ROPS**

***Data Table Description:*** 2003 PhaseII, January 2004, 2004 Focused, 2004 pre-ROPS, 2005 during-ROPS, and 2005-2007 post-ROPS sediment core data (Aroclor)

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey name (PhaseII = Phase II, Jan2004 = January 2004, Focused = Focused Studies, pre-/during-/post-ROPS = prior to/during/after ROPS construction) |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Point_ID | Sample identification code (matches with "location" in sed_aro_ROPS and sed_char_ROPS) |
| Northing | 1983 NY State Plane Northing (feet) |
| Easting | 1983 NY State Plane Easting (feet) |
| Water_elev | Water elevation (feet) |
| Sed_elev | Sediment elevation (feet) |
| Water_dep | Depth of water (feet) |
| Sed_dep | Sediment probing depth (feet) |
| Penet_ft | Penetration depth (feet) |
| Recovery | Sediment recovered during coring (feet) |
| HB_elev | Hard bottom elevation based on probing depth (feet) |
| Core_type | Sample collection technique (Manual = manual push cores, Vibracore = Vibracore) |

***Comments:***
(1) -999 indicates parameter not measured
(2) Water and sediment elevations based on USLS 35

**Table 17**
**Data Dictionary for sed_probe_ROPS**

***Data Table Description:*** 2004 and 2005 ROPS sediment probing data

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | ROPS survey (pre-ROPS = prior to ROPS construction, during-ROPS = during ROPS construction) |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Grid_ID | Sample identification code (matches with "location" in sed_aro_ROPS and sed_char_ROPS) |
| Northing | 1983 NY State Plane Northing (feet) |
| Easting | 1983 NY State Plane Easting (feet) |
| Water_elev | Water elevation (feet) |
| Sed_elev | Sediment elevation (feet) |
| Water_dep | Depth of water (feet) |
| Sed_dep | Sediment probing depth (feet) |
| HB_elev | Hard bottom elevation based on probing depth (feet) |
| Comments | Notes reported by field crew |

***Comments:***
(1) -999 indicates parameter not measured
(2) Water and sediment elevations based on USLS 35

**Table 18**
**Data Dictionary for treated_effluent_discharge_flow_ROPS**

***Data Table Description:*** Flow data measured on the discharge line following final water treatment during 2005 ROPS effluent discharge monitoring

| ***Field Name*** | ***Description*** |
|---|---|
| Start_date_time | Starting date and time for monitoring period |
| Avg_flow_gpm | Average flow during hour (gallons per minute) |
| Max_flow_gpm | Maximum flow during hour (gallons per minute) |
| Max_time | Time when maximum occurred (HH:MM:SS) |
| Vol_gal | Volume of water discharged (gallon) |
| Sample | Indication of approximately when grab or composite sample of effluent discharge taken (x = yes, blank = no sample); 4 sequential x's indicate that a 4-hour composite sample was taken; 1 x indicates a grab sample |

***Comments:***
(1) See treated_effluent_discharge_lab_ROPS for results of effluent discharge sampling.

**Table 19**
**Data Dictionary for treated_effluent_discharge_lab_ROPS**

***Data Table Description:*** Field and laboratory results from samples taken during 2005 ROPS effluent discharge monitoring

| ***Field Name*** | ***Description*** |
|---|---|
| Lab | Laboratory where samples were analyzed (Aquatec = Aquatic Biological Sciences, Inc.; ChemLab = Alcoa Massena ChemLab) |
| Lab_ID | Identification number assigned by the laboratory (ChemLab) |
| Sample_ID | Sample identification code |
| Collection_date | Sample collection date and time |
| Sample_type | Location of sample (INTERNAL = during process treatment; LAB = laboratory QA/QC sample, OUTFALL = after treatment) |
| QC_type | Type of sample (sample = field sample, blk = lab blank, lcs* = lab control sample, ms* = matrix spike, sd = matrix spike duplicate) |
| Parameter | Analyte or field parameter |
| Qualifier | Data qualifier (U = not detected) |
| Concentration | Result |
| Units | Units of result |
| Perrec_spike | Percent recovery of added spike (%) |

***Comments:***
(1) See treated_effluent_discharge_flow_ROPS for results of discharge flow monitoring.
(2) -999 indicates parameter not measured/not reported by laboratory

**Table 20**
**Data Dictionary for veg_aquatic_ROPS**

***Data Table Description:*** Aquatic vegetation data from near the proposed location for an ice control structure and from near shore areas during 2004 pre-ROPS and 2006 post-ROPS.

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey period (pre-ROPS = prior to Remedial Options Pilot Study) |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Sampling_Area | General area of sampling (near_ICS, near_shore) |
| Sample_ID | Location where sample was collected (US = upstream of proposed ICS; DS = downstream of proposed ICS; CON = control location near Madrid, NY; NB = northern bank/shoreline; SB = southern bank/shoreline) |
| Percent_Sed | Percentage of sediment (%) |
| Percent_Veg | Percentage of vegetation (%) |
| Veg_Width | Average width of vegetation (feet) |
| Wild celery *through* broad-leaved cattail | Percent Abundance of species identified (0 indicates no species found; '-5' = < 5% abundance) |

***Comments:***
(1) See 2004 ROPS Baseline Report (Alcoa, April 2005) for sampling locations.
(2) The proposed ice control structure site was to be located approximately 0.5 miles upstream of the Route 37 Bridge. However, due to community concerns related to the proposed siting of the structure, the ICS was not installed as planned as part of the ROPS.

**Table 21**
**Data Dictionary for veg_floodplain_ROPS**

***Data Table Description:*** Floodplain vegetation data collected on September 7 and 8, 2004 near the proposed location for an ice control structure.

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey period (pre-ROPS = prior to Remedial Options Pilot Study) |
| Forest_Cover | Type of forest cover (HERB = herbaceous, SHRB = shrubs, TREE = trees) |
| Common_Name | Common name of vegetation |
| TxPx | Transect number and plot (quadrant location along transect); Per = percentages of cover by individual species (%), count = number of stems of species) |

***Comments:***

(1) 0 indicates 0% and a count of zero

(2) See 2004 ROPS Baseline Report (Alcoa, April 2005) for sampling locations.

(3) The proposed ice control structure site was to be located approximately 0.5 miles upstream of the Route 37 Bridge. However, due to community concerns related to the proposed siting of the structure, the ICS was not installed as planned as part of the ROPS.

**Table 22**
**Data Dictionary for water_aro_ROPS**

***Data Table Description:*** 2005 ROPS water column data analyzed for PCBs and TSS

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | ROPS survey (pre-ROPS = prior to ROPS construction, during-ROPS = during ROPS construction) |
| Lab | Laboratory where samples were analyzed (ChemLab = Alcoa Massena ChemLab) |
| Lab_ID | Laboratory identification number |
| Sample_ID | Sample identification code |
| QC_TYPE | Sample type (sample=unfiltered field sample, soluble_pcb=filtered field sample, ms1=matrix spike, sd1=matrix spike duplicate, blk=TSS blank, lcs*=laboratory control spike) |
| Collection_date _time | Sample collection date and time |
| A_1016 *through* A_1260 | Aroclor_# concentration, where # = 1016, 1221, 1232, 1242, 1248, 1254, 1260 (micrograms/liter) |
| Total PCB | Aroclor total PCB concentration (micrograms/liter) |
| TSS | Total suspended solids (milligrams/liter) |
| TSS_dup_rec | Total suspended solids duplicate recovery (%) |
| TSS_rec | Total suspended solids recovery (%) |
| Location | Sample collection location |
| DUP | Indication of whether sample is a field duplicate or not (DUP = yes, blank = no) |
| QUAL_PCB | Data qualifier (J = estimated) |
| Decachlorobiph enyl | Decachlorobiphenyl concentration (micrograms/liter) |
| Tetrachloro-m-xylene | Tetrachloro-meta-xylene concentration (micrograms/liter) |
| Deca_perrec | Percent recovery of decachlorobiphenyl (%) |
| Tetra_perrec | Percent recovery of tetrachloro-m-xylene (%) |

*(continued)*

**Table 22**
**Data Dictionary for water_aro_ROPS**
**(continued)**

| ***Field Name*** | ***Description*** |
|---|---|
| A1221_perrec *through* A1260_perrec | A# percent recovery, where # = 1221, 1242, 1248, 1254, 1260 (%) |

***Comments:***

(1) -999 indicates parameter not measured

(2) Negative numbers (other than -999) indicate the concentration was below the detection limit (DL), i.e. -0.065 means the concentration was less than the DL of 0.065 micrograms per liter.

(3) Parentheses indicate depth at which sample was collected. If no depth is indicated, then sample is a composite of samples taken at 0.2, 0.5, and 0.8 the water column depth.

**Table 23**
**Data Dictionary for water_field_ROPS**

***Data Table Description:*** 2005 ROPS field water quality measurements made during water column sample collection

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey name (pre-ROPS = prior to ROPS construction; during-ROPS = during ROPS construction; post-ROPS = after ROPS construction) |
| Year | Sample year |
| Month | Sample month |
| Day | Sample day |
| Samp_time | Time of sample collection |
| Location | Sample collection location |
| Wc_dep | Depth of water (feet) |
| Sample_dep | Depth of sample (feet) |
| Temp | Temperature (degrees Celsius) |
| PH | pH (standard units) |
| Cond | Specific conductivity (milliSiemens/centimeter) |
| Turb | Turbidity (nephelometric turbidity units) |
| DO | Dissolved Oxygen (milligrams/liter) |
| Weather | Description of weather during sampling. |
| Air_temp | Air temperature (degrees Celsius) |
| Construct_ activity | Description of daily construction activity |
| Comments | Field notes |
| Strat_present | Stratification indicator (No = no stratification recorded; Yes = stratification was present, numbers indicate depth(s) of sample composited for analysis) |
| DepFrac_ Collected | Water column depth fraction at which samples were collected for analysis |
| DUP_Collect Loc | Duplicate sample location |

***Comments:***
(1) -999 indicates parameter not measured; N/A indicates parameter not applicable

**Table 24**
**Data Dictionary for water_turbidity_ROPS**

***Data Table Description:*** 2005 ROPS turbidity measurements during silt curtain anchor installation, scow transport out of the silt curtain area, and air curtain usage

| ***Field Name*** | ***Description*** |
|---|---|
| Survey | Survey name (pre-ROPS = prior to ROPS construction; during-ROPS = during ROPS construction) |
| Year | Year of measurement |
| Month | Month of measurement |
| Day | Day of measurement |
| Time | Time of measurement |
| Location | Sample collection location |
| Loc_descrip | Additional description of sample collection location (Adj to Curtains = adjacent to silt curtains; D/S of Curtains = downstream of silt curtains; U/S of Curtains* = upstream of silt curtains; North Shore = northern bank/shoreline; Center Channel = center (1/2 the distance across river); South Shore = southern bank/shoreline) |
| Wc_dep | Depth of water (feet) |
| 0.2Turb | Turbidity at the water column depth fraction of 0.2 (nephelometric turbidity units) |
| 0.5Turb | Turbidity at the water column depth fraction of 0.5 (nephelometric turbidity units) |
| 0.8Turb | Turbidity at the water column depth fraction of 0.8 (nephelometric turbidity units) |
| Comments | Field notes |

***Comments:***
(1) -999 indicates parameter not measured